FHWA-MA-EIS-82-02-FS2

CENTRAL ARTERY (I-93)/TUNNEL (I-90) PROJECT

FINAL

SUPPLEMENTAL

ENVIRONMENTAL IMPACT STATEMENT

Central Artery – Boston, Massachusetts

- **Index**
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Massachusetts Department of Public Works

January 1991

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(This Volume Only)

Central Artery/Tunnel
Massachusetts Department of Public Works

March 1, 1991

Dear Librarian:

Enclosed are two volumes which together with parts of the 1990 Final Supplemental Environmental Impact Report (1990 FSEIR) for the Central Artery(I-93)/Tunnel(I-90) Project comprise the Final Supplemental Environmental Impact Statement (Final SEIS) and Section 4(f) evaluation for this project. These documents fulfill the environmental review requirements of the National Environmental Policy Act (NEPA) and Section 4(f) of the Department of Transportation Act of 1966.

You received a copy of the 1990 FSEIR which was submitted by the Massachusetts Department of Public Works in November 1990, to fulfill the requirements of the Massachusetts Environmental Policy Act (MEPA). This Final SEIS complements the FSEIR. The attached provides an explanation of the contents of the Final SEIS.

Please make these documents available in the reference section of your library.

Comments may be submitted as part of the federal review process for this project by April 8, 1991 to:

Mr. Alexander Almeida
Federal Highway Administration
55 Broadway Street 10th Floor
Cambridge, MA 02142

If you have questions, or would like additional information on the 1990 FSEIR or the Final SEIS, please call Dick Jarvis or Lydia Mercado at (617)951-6000.

Sincerely,

W. V. Twomey

William V. Twomey
Director, I-93/I-90 Project

091-0459
AL-7.1

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The Final SEIS consists of six parts.

Enclosed are:

- The Federal Summary (one volume)

  Contains descriptions of refinements of the Project since the Draft SEIS/R to fulfill the requirements of the National Environmental Policy Act; the Final Section 4(f) Evaluation of the Department of Transportation Act of 1966 (formerly Part III of the FSEIR); and the permit concerns of federal agencies with jurisdiction over the Project. This volume also contains an appendix with copies of important documents referenced in the text, such as the Certificate of the Massachusetts Secretary of Environmental Affairs on the 1990 FSEIR.

- The Federal Appendix (one volume)

  Contains (i) an expanded index to the 1990 FSEIR and a separate index to this Final SEIS, (ii) errata in the other volumes of the 1990 FSEIR, (iii) a list of technical documents upon which the Final SEIS relies.

The following were sent to you on November 15, 1990:

- Part I (three volumes)

  Describes the Proposed Action and its long-term and construction period impacts.

- Part II (one volume)

  Describes the alternatives analyses conducted for three major design refinements of the Project, and for the materials disposal program.

  Note: Part III is now included in the Federal Summary.

- Part IV (two volumes)

  Documents the oral and written testimony and comments received through the public review process and responses to each.

- Appendices (two volumes)

  Contains the Supportive Engineering Report and Summary of Changes to Appendices since the Draft SEIS/R.

Index (1990 FSEIR)

INDEX (1990 FSEIR)

Index To This Final SEIS

Index Of Final SEIS

Errata

ERRATA

This section contains the Errata pages on which corrections have been made to the Artery/Tunnel Project Final Supplemental Environmental Impact Report (1990 FSEIR). Corrections on tables are noted by strike-out lines with the correction nearby in italics. Text changes are noted as follows: deletions are indicated by strike-out lines and additions are indicated by double underlines. The table which follows indicates if pages of the 1990 FSEIR are changed (i.e., tables or text) and which chapters remain unchanged (no change). The errata pages are placed in the chapter order indicated. In addition, those chapters which have been revised or updated for inclusion in this Final Supplemental Environmental Impact Statement (Final SEIS) are indicated in the first column.

Chapter	Title	Final SEIS	1990 FSEIR		
			Text	Tables	No Change
Part I	**Proposed Action and Impacts**				
	Summary	√			
1	Introduction				√
2	Proposed Action		√		
3	Transportation		√	√	
4	Air Quality		√	√	
5	Noise and Vibration		√		
6	Energy				√
7	Economic Characteristics		√		
8	Land Use and Neighborhood Characteristics			√	
9	Visual Characteristics				√
10	Historic Resources				√
11	Archaeological Resources				√
12	Utilities				√
13	Water Quality				√
14	Wetlands and Waterways		√	√	
15	Floodplains				√
16	Vegetation and Wildlife				√
17	Soils and Geology				√
18	Irreversible and Irretrievable Commitment of Resources				√
19	Short-Term Use of the Environment and Long-Term Productivity				√
20	Summary of Construction Activity		√	√	

Chapter	Title	Final SEIS	1990 FSEIR		
			Text	Tables	No Change
Part II	**Alternatives Analyses**				
A	Introduction				√
B1	Area North of Causeway Street		√	√	
B2	South Boston Bypass Road				√
B3	Alternative Toll Plaza Locations				√
B4	Materials Disposal		√		
Part III	**Section 4(f) Evaluation**				
1	Introduction	√			
2	Parklands	√			
3	Historic Resources	√			
4	Archaeological Resources	√			
5	Coordination	√			
Supportive Engineering Report					
1	Introduction and Overview				√
2	Area North of Causeway Street			√	
3	Central Area			√	
4	I-93/I-90 Interchange and Massachusetts Avenue Interchange Area			√	
5	South Boston/South Boston Bypass Road Area			√	
6	Third Harbor Tunnel Area				√
7	East Boston/Logan Airport Area			√	
8	Projectwide Elements				√

Chapter	Title	Final SEIS	1990 FSEIR		
			Text	Tables	No Change
Appendices					
	Transportation			√	
	Noise and Vibration				√
	Permits and Approvals				√
	404(b)(1) Program				√
	Wetlands and Waterways		√	√	
	Construction				√
	Construction Mitigation				√
	Maintenance of Traffic Plan				√
	Materials Disposal				√
	Public Participation				√
	Historic Resources				√
	Conceptual Relocation Report				√
	Joint Development				√

require that multiple exits or ramp movements be located together immediately after the toll plaza, with insufficient weaving distances possible.

With the relocation of the toll booths, vertical and horizontal curves and, thus, sight distances have been improved on the approaches to the toll collection areas, resulting in improved safety conditions. Also, the inadequate weaving distances in South Boston have been eliminated by moving the toll operations to Logan Airport, where longer sighting distances are possible.

Additional advantages result from locating the toll facilities at Logan Airport. For example, traffic studies show that during peak hours queues will develop at the westbound approach to the Third Harbor Tunnel. This will be caused by traffic merging down into two lanes to enter the tunnel, regardless of the location of the toll booths. Placing the toll collection booths upstream of the tunnel entrance will enable operators to collect tolls from vehicles which are stopped and waiting for merging and will eliminate the need for vehicles to stop in South Boston, which would be the case if the toll booths were located there. Another advantage is that by having the toll plaza at the eastern end of the Third Harbor Tunnel, operators will be able to meter vehicle flow into the tunnel during peak flow hours or emergencies, ~~therefy~~ thereby increasing tunnel efficiency.

2.3.7 High-Occupancy Vehicle (HOV) System

An Improved HOV System Has Been Incorporated Into The Proposed Action Design: The Artery/Tunnel Project has been designed to incorporate a system of special facilities and preferential treatments for HOVs. This system will enable HOVs to bypass congested segments of the highway on special lanes, which will provide HOV passengers with substantial travel time savings and allow the highway to process significantly higher volumes of person trips, thereby providing for the most efficient use of limited roadway space.

Vehicles eligible to use the HOV system include buses, two-plus-person car pools, vanpools, taxis and limousines. The system has been designed to be compatible with a planned reversible HOV lane on the Southeast Expressway between the project limits and Braintree. The Braintree lane proposal is a separate project from the Artery/Tunnel Project.

The HOV system consists of a series of integrated queue bypasses and connecting ramps and lanes that will link the Southeast Expressway, I-90, downtown Boston, SSTC, and Logan Airport. The concept incorporates the following basic elements:

- I-90 eastbound (c-d) roadways with priority entrance to the Third Harbor Tunnel
- I-90 westbound priority entrance to the Third Harbor Tunnel
- I-90 westbound priority ramps to I-93 southbound and SSTC
- I-93 southbound exclusive HOV head-of-queue lane
- I-93 northbound exclusive HOV lane feeding into I-90 eastbound c-d roadway and providing access to the SSTC
- Priority access ramps to SSTC

The system will carry high volumes of HOV trips, particularly as measured in terms of person trips, due to the relatively high proportion of buses among all HOVs. HOVs will bypass 1operational bottlenecks in the general-purpose lanes, which will

1 Please note: Due to a production error, the text from Section 2.3.7 marked above and continuing to the next page was omitted during printing of the final bound edition.

result in more reliable and generally faster travel. The benefits associated with the system will increase over time with future traffic growth, and with the possible addition of an HOV link to Braintree.

The Artery/Tunnel Project HOV system serves a critical function, in providing a coherent, interconnected series of queue bypass lanes and preferential treatments for HOVs. These elements allow HOVs to bypass operational bottlenecks that delay general-purpose traffic flow at key locations where expansion of general-purpose capacity is precluded by physical constraints or excessive cost. The system is short in length, but nevertheless provides substantial travel time savings. While the concept has important independent utility, it also is designed to be compatible with a potential future HOV link to Braintree. Each segment of the system carries high traffic volumes, particularly in terms of person trips, which far exceed the number of persons travelling in each of the general-purpose lanes.

In the absence of the HOV system, the delays experienced by HOVs would increase by up to 11 minutes on the major routes covered by the system.

2.3.8 Tunnel Ventilation

The Final Locations Of Ventilation Buildings Have Been Identified In The Proposed Action: Evolution of the project design since the FEIS/R has resulted in new requirements for ventilation by redefining tunnel lengths, numbers of travel lanes, location and length of access and egress ramps, etc. The final result is an alignment which requires only six (instead of nine recommended in the FEIS/R) new ventilation buildings, each one serving a discrete sector of the project. Each of those ventilation sectors is defined by subsurface constraints, such as MBTA tunnel crossings or the tunnel portals.

The final selection of sites for these ventilation buildings results from an intensive alternative evaluation and screening process which was based on a full range of criteria including public health and safety, air quality, land use, water resource impacts, visual impacts, and historic resources, as well as technical feasibility and costs. This analysis is the subject of the Ventilation Building Site Report, a technical report that describes the screening process that was employed to reduce the initial 189 candidate sites down to seven. Ventilation building 2 has been eliminated since the Draft SEIS/R due to a design change in the I-93/I-90 Interchange (see Section 2.4.3 below), Air quality impacts of the tunnel ventilation system are described in Chapter 4; land use and visual characteristics of the ventilation buildings are described in Chapters 8 and 9, respectively. Graphics of the ventilation buildings are located in the SER.

2.4 DESIGN MODIFICATIONS SINCE THE DRAFT SEIS/R

Section B of Part II of this document discuss alternative design options to the 1985 FEIS/R Preferred Alternative which were considered in developing the 1990 SEIS/R Proposed Action. This section briefly discusses further design modifications to the Proposed Action made since the Draft SEIS/R was published in May 1990.

These design modifications are a result of the continuing process of review and improvement and in response to comments from affected communities, public agencies, FHWA, and the general public. In particular the Department has made a series of design refinements based, in part, on the results of the ongoing value engineering process. FHWA has formally mandated a process known as value engineering for major highway projects such as the Artery/Tunnel Project. In this process, the project proponent (i.e., the Department) is required to engage the services of a group of engineers who are independent of the project, and who can give peer level critiques of the proposed engineering designs. In addition, formal public input delivered to the Department during the SEIS/R process has yielded valuable design criticisms.

Table 3.6 summarizes some of the major impacts of the project in the year 2010, compared both to conditions in 2010 without the project -- the 2010 baseline -- and existing conditions. As a result of the project, average network speeds in 2010 are estimated to be 24 percent higher on a daily basis than they would be if the project were not built. (The network includes most roadways in the project study area, as defined in Section 3.1.) In the downtown area, the Proposed Action will cause operating speeds in the roadway network (including local streets) to increase by 45 percent on a 24-hour basis, and by 43 percent in the PM peak hour. Additional impacts shown in the table include a 7 percent increase in the number of vehicle miles travelled (VMT) throughout the study area, at the same time that vehicle hours travelled (VHT) will be reduced by 14 percent. The small change in VMT results from the rerouting of vehicle trips onto the study area's limited-access highway system. The substantial reduction in VHT results from improved travel speeds throughout the study area on both expressways and local roadways. On local streets and arterials, average weekday VMT will decrease 10 percent, and VHT will decrease by 16 percent, reflecting the diversion of vehicles away from City streets.

The table further shows that the Proposed Action will result in improved traffic operating conditions on the expressway system and at local roadway intersections, as measured in terms of level of service indicators. Without the project, 60 percent of the expressway links in the core of the study area would operate during the PM peak hour at highly congested LOS F conditions. With the Proposed Action in place, however, the number of LOS F highway segments in the PM peak hour will be reduced to 21 percent. Among ~~37~~32 comparable strategic intersections (selected on the basis of potential sensitivity to project-related impacts), 10 and 14 would operate with one or more approaches at LOS F during the AM and PM peak hours, respectively, without the project. As a result of the Proposed Action, however, the number of intersections with one or more approaches at LOS F will be reduced to 8 and 6, in the AM and PM peak hours, respectively.

It is clear that even with the massive improvements represented by the Central Artery and Third Harbor Tunnel in place, traffic will not flow unimpeded in the year 2010 at all places and at all times. Activity in the Boston metropolitan area will continue to expand independently of the project, and transportation requirements increase accordingly. A corollary is that, if the Proposed Action is not implemented, the traffic circulation system that has helped support a vital and burgeoning central Boston will become dysfunctional.

3.2.2 Transportation Analysis Methodology

Throughout this section, transportation impacts associated with the Artery/Tunnel Project are identified in comparison with future conditions without the project; the latter case is referred to as the 2010 baseline condition. The Proposed Action and 2010 baseline are defined further as follows:

- The 2010 baseline: describes what traffic conditions would be like in the study area if all the major established trends continue and no substantial ameliorative actions are taken; it defines a solid baseline against which the positive and negative effects of the Proposed Action can be evaluated. (In many EIS documents for other projects this set of forecasts is referred to as the no-build scenario.) This comparison isolates the impacts that are specifically related to the Proposed Action, as opposed to changes that would occur in the future as a consequence of other factors.

- The 2010 build condition: is a forecast of the traffic and transportation loads and behavior on all segments of the network with the Proposed Action in place.

The 2010 baseline roadway network is assumed to remain largely unchanged from existing conditions, with the exception of certain specific modifications, including the CANA project and a relocated Northern Avenue bridge. A number of additional modifications to the roadway

- South Boston
- East Boston/Logan Airport Area

Area North Of Causeway Street. In this subarea, the Proposed Action will provide five through travel lanes in each direction over the Charles River bridge, in addition to ramps that will connect Route 1 and Leverett Circle, eliminating the need to use I-93 for movement between these two highways. Operating conditions will improve to an acceptable LOS C/D range on these sections of the I-93 mainline.

In the 2010 baseline, the existing severe bottleneck on the northbound Charles River bridge would become much worse. In the southbound direction, five lanes from I-93 and Route 1 combined would neckdown to three lanes on the bridge. Long approach queues and delays would result in both directions during both daily peak periods.

North of the Charles River bridge on I-93, daily traffic volumes will increase by 28 percent northbound and 42 percent southbound, as a result of the Proposed Action. Peak hour traffic volumes on I-93 also will be substantially higher with the Proposed Action in place. The success of the Proposed Action in this area is illustrated by the ability to accommodate these increases in volume while experiencing no deterioration in LOS as compared to the 2010 baseline condition. Volumes carried during these time periods increase by 50 percent relative to the 2010 baseline condition. In the southbound direction, traffic operations will improve somewhat in both AM and PM peak hours as a result of the Proposed Action, despite a 40 percent increase in traffic volume, with some segments exhibiting more noticeable improvements than others.

On the Tobin Bridge, northbound traffic will operate at LOS D and F in the AM and PM peak hours, respectively, under both the Proposed Action and the 2010 baseline. In the southbound direction, the Proposed Action will cause traffic conditions to improve from LOS F to C in the AM peak hour, and E to C in the PM peak hour, although the volume of traffic carried will increase. Alleviation of the southbound bottleneck approaching the Charles River bridge, downstream of the Tobin Bridge, will account for this improvement in traffic operations.

Traffic conditions at the three key intersections in the Area North of Causeway Street are discussed below:

- Leverett Circle, the intersection of Charles and Nashua Streets, and the O'Brien Highway: This intersection will operate at LOS B to C with the Proposed Action in place, which represents a major improvement over the 2010 baseline condition (breakdown LOS F). Operations with the Proposed Action also will be substantially better than existing conditions.

  The major improvement in travel conditions can be traced directly to three geometric modifications. First, the eastbound Storrow Drive approach to the Circle will be removed and shifted to an underpass beneath the intersection connecting to the I-93 access ramps. Second, mainline and ramp modifications on I-93 will eliminate the merge and bottlenecks that currently cause intermittent queuing on the connector ramps and thus restrict flow leaving the Circle. Third, traffic movements from Nashua Street to the I-93 ramps will take place on a new connector upstream of the intersection, minimizing the need for vehicular storage between the northeastbound and southwestbound approaches.

- City Square, the intersection of Chelsea Street, North Washington Street (the Charlestown bridge), and Rutherford Avenue: With the Proposed Action in place, increased delays will be experienced at this intersection in the AM peak hour only, resulting in LOS F conditions, compared to LOS E in the 2010 Baseline. In the PM peak hour, the Proposed Action will result in a marginal improvement in the operation of this intersection, with two of the

approaches operating in the LOS D-E range, whereas all approaches would be at LOS F in the 2010 baseline.

~~this intersection will show marginal improvement compared to the future baseline, where most approaches would operate in the E to F range, with all but one approach experiencing delays exceeding 100 seconds per vehicle (SPV). In the Proposed Action condition, the intersection will operate near capacity in the LOS D to F range, with reduced delays compared to the 2010 baseline. Changes in the level of service as a result of deleting the Traverse Street I-93 on ramp have been negligible. (In analyzing this intersection, a left turn prohibition was assumed from the Charlestown bridge northbound to the I-93 entrance ramp during peak hours.) PM peak hour traffic volume will be 260 vehicles (6 percent) higher on the Charlestown bridge, as a result of deleting the Traverse Street ramp from the Proposed Action since the Draft SEIS/R. Removal of the ramp, however, will cause PM peak hour volumes on Rutherford Avenue to decrease by 810 vehicles (20 percent). Traffic volume on the Charlestown bridge will be lower than in the 2010 baseline.~~

- Charles River dam/Commercial Street/Gilmore Bridge/O'Brien Highway: The Proposed Action will not have a major impact on this intersection. Removal of the Traverse Street on-ramp will have a negligible effect on the operation of this intersection despite a small increase in daily traffic on the Charles River dam.

Central Area. In this subarea, the Proposed Action comprises a new I-93 tunnel within downtown Boston, as well as strategic surface service roads (Atlantic Avenue and Surface Artery) carrying vehicular traffic to and from the mainline.

Traffic volumes on the Central Artery will increase for the Proposed Action as the improved highway alignment will have an expanded carrying capacity to accommodate greater vehicular demands. Traffic operations along the mainline will improve substantially from the widespread breakdown conditions experienced currently and forecast in the future baseline case. The inbound bottleneck locations approaching downtown from north and south will be reconstructed under the Proposed Action to accommodate a significantly higher traffic volume, thereby diverting traffic from parallel surface arterials such as the Charlestown bridge. Despite the fact that more traffic will use the Central Artery in the Proposed Action case, peak period flow will be relatively uncongested. In the morning, delays will be limited to the southbound segment upstream of the merge between the Leverett Circle on-ramp and the mainline, and weaving congestion on and approaching the southbound segment between the New Chardon Street entrance and the Oliver Street exit. In the PM peak hour, the Central Artery generally will operate at speeds in the 30 to 40 mph range, except for the southbound eastern barrel immediately upstream of the merge with the western barrel.

Some peak period entrance ramp congestion in the Central Area is expected under the Proposed Action. Specifically, the northbound ramp from Essex Street/Northern Avenue will operate at LOS F during both the morning and afternoon peak periods and the southbound ramp from Congress Street will operate at LOS F during the afternoon peak period. Since these ramps will enter the mainline as added lanes, merging maneuvers will not be required, and ramp congestion is not anticipated to significantly affect mainline flow.

Major existing deficiencies on the Central Artery would cause increased congestion in the 2010 baseline condition. Severe congestion would occur in the 2010 baseline at the northbound Central Artery merge with the entrance ramp from Leverett Circle. The high entrance volumes would require two travel lanes, disrupting flow in the left lane of the already constricted Artery. A heavy demand on the now lightly used Haymarket southbound off-ramp also would result in weaving congestion and speed reductions for exiting motorists as well as those entering from Leverett Circle. Downstream, congestion would be expected approaching the Beach Street exit ramp as a

- Relocation of I-90 toll booths from South Boston downstream of the westbound Third Harbor Tunnel exit, to East Boston upstream of the tunnel entrance - toll booth relocation will substantially improve safety and traffic flow through the tunnel and at its approach and exit. Detailed operational characteristics of this change are described in Part II, Chapter 2, of this SEIS/R.

3.5 RESOLUTION OF MAJOR ISSUES SINCE THE DSEIS/R

The analysis of transportation impacts has been revised as follows, in response to comments received on the Draft SEIS/R:

- An analysis of weekend traffic conditions has been added.
- A more detailed description of truck access to the South Boston seaport and industrial area has been added.
- Actual volumes of trucks transporting hazardous cargoes are presented for key locations.
- The design of the HOV system has been changed to provide increased travel time savings for HOVs, and improved operating conditions for trucks using the South Boston Bypass Road.
- A ramp has been added from I-90 westbound to I-93 northbound to provide improved truck access from South Boston to points north.
- The connection between the Seaport Access Highway and Congress Street has been improved to provide better access to the Financial District.
- A broader commitment is expressed to work with the City of Boston on surface street operational and geometric improvements, as well as parking supply controls, to mitigate the few projected instances of negative traffic impacts.
- Analysis of traffic operating conditions at the intersection of Boardman Street and Route 1A has been added.
- Analysis of impacts on radial highways outside the study area has been added.
- Additional information is provided regarding the status of planned public transportation capital projects.
- Pedestrian access to the MBTA Airport station has been improved.
- The feasibility of a rail connection between North and South Stations is discussed.
- A sensitivity analysis section has been added to the Transportation Appendix. This analysis tests the effect of key variables (e.g., land use growth, parking policy, use of airport ground access services) in terms of traffic conditions.

Table 3.8

EXISTING AND PROJECTED AVERAGE WEEKDAY DAILY TRAFFIC ON SELECTED SURFACE STREET LINKS

Link No.	Highway Links	1987/88 Existing	2010 Future Baseline	2010 Proposed Action
ML1	Old Colony Avenue N of Columbia NB	14,500	19,200	16,300
ML3	Massachusetts Avenue S of Glynn NB	8,300	9,100	12,600
ML5	Columbus Avenue N of Mass NB	6,100	8,000	8,600
ML7	Huntington Avenue N of Mass NB	10,700	11,100	10,900
ML9	Boylston Street E of Mass EB	12,500	16,100	15,500
ML11	Broadway Bridge EB	15,600	17,700	8,200
ML13	A Street N of West Second NB	6,700	9,400	8,600
ML15	D Street N of Cypher NB	4,400	7,800	7,800
ML18	Summer Street Bridge EB	16,600	19,100	15,200
ML20	Congress Street Bridge EB	8,500	10,200	4,900
ML24	Atlantic N of Congress NB	19,100	24,900	26,600
ML25	Congress Street N of State NB	17,000	17,300	16,100
ML27	Cambridge Street N of Court NB	9,000	10,500	11,400
ML28	Commercial Street S of Charter NB	11,100	13,200	12,900
ML30	Charlestown Bridge NB	28,100	33,900	29,100
ML32	Charles River Dam EB	26,000	26,100	25,200
ML34	Harvard Bridge EB	10,000	16,300	16,100
ML36	Gilmore Bridge NB	13,800	23,000	19,200
ML38	Rutherford Avenue N of Austin NB	19,500	29,000	29,400
ML40	Meridian Street N of Princeton NB	6,700	6,900	5,900
ML41	Bennington Street W of Prescott EB	5,000	6,000	5,700
ML42	Chelsea Street N of Porter NB	5,000	5,050	5,300
ML2	Old Colony Avenue N of Columbia SB	15,700	16,600	15,500
ML4	Berkeley Street E of Tremont WB	11,100	13,600	17,100
ML6	Columbus Avenue N of Mass SB	7,700	8,700	9,200
ML8	Huntington Avenue N of Mass SB	11,100	17,700	16,400
ML10	Boylston Street E of Mass WB	1,500	1,700	1,700
ML12	Broadway Bridge WB	16,200	16,400	12,700
ML14	A Street N of West Second SB	5,600	9,700	9,400
ML16	D Street N of Cypher SB	4,500	6,700	6,400
ML17	Boston Street S of Andrew Square SB	5,000	6,500	5,200
ML19	Summer Street Bridge WB	12,500	17,100	7,800
ML21	Congress Street Bridge WB	4,200	9,600	4,800
ML22	Harrison Avenue N of Kneeland SB	6,200	7,600	5,800
ML23	Purchase Street N of Pearl SB	18,500	27,200	32,700
ML26	Congress Street N of State SB	14,000	16,400	16,200
ML29	Commercial Street S of Charter SB	9,700	13,100	12,400
ML31	Charlestown Bridge SB	25,000	31,300	27,500
ML33	Charles River Dam WB	18,000	20,600	22,500
ML35	Harvard Bridge WB	10,000	29,400	22,100
ML37	Gilmore Bridge SB	13,500	20,000	18,400
ML39	Rutherford Avenue N of Austin SB	29,700	38,800	37,600

1. Numbers in left-most *and center* columns reference locations shown in Figure 3.4. For numbers in ~~center-and~~ right-~~hand~~*most* columns, reference locations shown in Figure 3.9.

Source: Bechtel/Parsons Brinckerhoff

Table 3.9

PROJECTED AVERAGE WEEKDAY DAILY TRAFFIC SCREENLINE CROSSINGS

	Screenlines	~~1987/88 Existing~~ 2010 Baseline	~~2010 Future Baseline~~ 2010 Proposed Action	~~2010 Proposed Action~~ 2010 Percent Difference
1.	Kneeland Street	132,000	105,820	-20%
2.	Oliver-Pearl Streets	69,200	62,100	-10%
3.	State Street	130,200	112,700	-13%
4.	Causeway Street	154,600	137,400	-11%
5.	Cambridge-Tremont Streets	268,800	260,300	-3%
6.	South Station/Summer Street	68,000	58,500	-14%
7.	Hanover Street	75,200	70,000	-7%
8.	East Boston-Visconti Way/Porter Street	35,700	31,500	-12%
9.	East Boston Day Square	68,700	57,500	-16%
10.	East Boston Bremen Street	28,600	14,700	-49%
11.	South Boston Cypher-West First Streets	84,100	81,900	-3%
12.	Fort Point Channel	162,000	116,600	-28%
13.	Charles River	178,200	174,500	-2%
	Combined Volume of all Screenlines	**1,455,400**	**1,283,520**	**-12%**

1. Detailed screenline data provided in Transportation Appendix

Source: Bechtel/Parsons Brinckerhoff

Table 3.12 (Cont.)

TRAFFIC OPERATIONS AT CRITICAL RAMP AREAS

FSEIS Ramp No.	Location		Lane 1 Merge Volume (pcph)[1] AM	PM	Level of Service AM	PM
I-90 Westbound Merges						
WR8	I-93 NB/Frontage Road ON to I-90		1,430	1,760	C	E
WR3	Airport ON to I-90	*First Merge:*	1,570	1,410	D	C
	(Two-lane merge)	*Second Merge:*	1,530	1,740	D	D
WR9	Albany Street/I-93 SB ON to I-90		1,060	1,960	C	E
2010 BASELINE:						
I-93 Northbound Merges						
NR2	Columbia Rd ON to SE Expressway		>2,000	1,660	F	C
NR6	Mass Ave ON to SE Expressway		>2,000	1,160	F	C
NR11	E. Berkeley St ON to Central Artery		>2,000	*	F	*
NR13	I-90 (Turnpike) ON to Central Artery		>2,000	*	F	*
NR20	Congress Street ON to Central Artery		>2,000	*	F	*
NR21	Northern Avenue ON to Central Artery		>2,000	*	F	*
NR29	Leverett Circle ON to Central Artery		N/A	>2,000	N/A	F
I-93 Southbound Merges						
SR13	Haymarket/Sumner Tunnel ON to Central Artery		>2,000	*	F	*
SR31	Mass Ave ON to SE Expressway		>2,000	N/A	F	N/A
SR36	Southampton Street ON to SE Expressway		1870	>2,000	C	F
SR6	Tobin Bridge (Rt.1) ON		*	>2,000	*	F
I-93 Northbound Lane Additions						
NR17	South Street ON to Central Artery		1,220	*	C	*
NR24	Sumner Tunnel ON to Central Artery		1,730	*	D	*
NR29	Leverett Circle ON to Central Artery NB		1,730	N/A	D	N/A
NR28	Rte.1 ON to I-93 NB I-93		420	1,450	A	C
I-93 Southbound Lane Additions						
SR6	Tobin Bridge ON to Central Artery SB		2,370	N/A	F	N/A
SR8	Leverett circle ON to Central Artery SB		1,890	*	E	*
SR10	Causeway ON to Central Artery SB		1,790	*	E	*
SR16	Purchase St ON to Central Artery SB		1,040	*	C	*
SR19	Congress St ON to Central Artery SB		610	*	B	*
SR24	I-90/Kneeland ON to Central Artery SB		1,700	*	D	*
SR28	E. Berkeley/Albany St ON to S.E. Expressway		760	>2,000	B	F
SR31	Mass Ave ON to S.E. Expressway SB		N/A	1,350	N/A	C
Route 1A NB Lane Additions						
NR33	Airport to Rt.1A NB		780	>2,000	B	F
Route 1A SB Lane Additions						
SR39	Neptune Rd ON to Rte 1A SB		770	>2,000	B	F
SR42	Airport ON to Rte 1A SB		1,000	0	B	A

1. *pcph: Passenger cars per hour*
2. * Ramp congestion due to downstream obstruction.
3. N/A: Not applicable

Source: Bechtel/Parsons Brinckerhoff

Table 3.15

PROJECTED TRAFFIC OPERATIONS AT SIGNALIZED INTERSECTIONS

Intersection No.	Approach	Approach Delay (sec/veh) Future Baseline AM	Future Baseline PM	Proposed Action AM	Proposed Action PM	Volume-to-Capacity Ratio Future Baseline AM	Future Baseline PM	Proposed Action AM	Proposed Action PM	Level of Service Future Baseline AM	Future Baseline PM	Proposed Action AM	Proposed Action PM
I-2	**City Square**												
	I-93 Exit EB	~~>100~~ *51*	~~>100~~ *107*	>100	>100	~~1.18/1.26~~ *1.03/0.82*	~~1.36/0.55~~ *1.15/0.82*	1.17/1.28	1.30/1.34	~~F~~ *E*	F	F	F
	Chelsea WB	~~>100~~ *45*	~~>100~~ *98*	>100	>100	~~1.26/0.70/0.67~~ *1.03/0.64*	~~1.36/0.96/0.14~~ *0.73/1.15*	1.28/1.23/0.22	1.29/1.34/0.05	~~F~~ *E*	F	F	F
	N. Wash. NB	~~49~~ *29*	~~>100~~ *87*	93	58	~~1.26/0.57/0.60~~ *1.03/0.72*	~~1.36/1.36~~ *1.15/1.06*	1.17/0.73	1.09/0.73	~~E~~ *D*	F	F	E
	Rutherfd SB	~~>100~~ *43*	~~>100~~ *88*	>100	32	~~1.20/1.26/0.27~~ *0.98/1.03/0.31*	~~0.11/1.34/1.16~~ *0.18/1.15/0.81*	1.17/1.28/0.93	1.34/0.74/0.91	~~F~~ *E*	F	F	D
I-1	**Leverett Circle**												
	Chs Rv Dam EB	>100	>100	22	16	1.31/0.51	1.36/0.61	0.91/0.93	0.94/0.78	F	F	C	C
	Chs (Storw) NB	>100	>100	13	20	1.04/1.31/0.52	1.36/0.96/0.22	0.36/0.76	0.98/0.82	F	F	B	C
	Nashua SB	90	4	26	18	1.31/0.34	0.33	0.97	0.94	F	A	D	C
I-54	**Gilmore Br./O'Brien Hwy**												
	Commercial EB	>100	>100	>100	>100	0.94/1.31/0.20	0.56/1.32/0.21	1.08/1.37/0.18	0.68/1.29/0.24	F	F	F	F
	Gilmore WB	>100	>100	>100	>100	1.31	1.32	1.37	1.29	F	F	F	F
	Chs Rv Dam NB	93	90	83	>100	1.31/0.82/0.95	0.90/1.10/0.46	1.22/0.88/0.97	1.13/1.14/0.39	F	F	F	F
	O'Brien Hwy SB	>100	>100	>100	>100	0.93/1.31/1.09	1.32/1.32/0.41	1.39/1.39/1.37	1.29/1.29/0.42	F	F	F	F
I-30	**Keany Square**												
	Causeway EB	~~>100~~ *95*	~~>100~~ *76*	55	>100	~~1.75/0.45~~ *1.13/0.68*	1.84/0.54	~~1.08/0.75~~ *1.09/0.76*	1.33/0.45	F	F	E	F
	Commercial WB	~~>100~~ *134*	~~>100~~ *88*	65	>100	~~0.16/1.75/0.53~~ *0.20/1.15*	0.37/1.84/1.23	~~0.21/1.04~~ *0.39/1.05*	0.31/1.33	F	F	F	F
	N. Wash. NB	~~>100~~ *98*	~~>100~~ *83*	67	>100	~~1.71~~ *1.04/1.10*	1.84 1.84	~~1.12/0.39~~ *1.02/1.10*	1.33/0.16	F	F	F	F
	Char. Br. SB	~~>100~~ *80*	~~>100~~ *86*	53	89	~~1.72/1.75/1.52~~ *1.16/1.09*	1.84/0.99/0.65	~~1.11/0.66/1.14~~ *1.05/1.11*	1.33/0.36/0.56	F	F	E	F
I-16	**Causeway/Lomasney/Merrimac**												
	Staniford NEB	30	28	21	23	0.63/0.72	0.87/0.68	0.63/0.75	0.76/0.70	D	D	C	C
	Causeway SWB	25	34	52	40	0.45/0.71	0.21/0.87	0.93/0.97/1.06	0.59/0.85/0.99	C	D	E	E
	Merrimac NWB	20	33	59	39	0.38/0.70	0.60/0.88	0.67/1.08	0.45/0.98	C	D	E	D
	Lomasney SEB	15	22	25	23	0.71/0.55	0.66/0.87	0.84/0.91	0.62/0.91	C	C	D	C
I-43	**Causeway/Surface Artery SB**												
	Causeway EB			7	10			0.84/0.31	0.68/0.79			B	B
	Causeway WB			7	9			0.89	0.79			B	B
	N Station Gar.			32	33			0.37	0.79			D	D
I-48	**Causeway/Surface Artery NB**												
	Causeway EB			16	20			0.59	0.62			C	C
	Causeway WB			22	23			0.77	0.64			C	C
	Surface Art. NB			20	16			0.77/0.04	0.64/0.39			C	C
I-15	**New Chardon/N. Washington**												
	Cross WB	31	19			0.89	0.62			D	C		
	N. Wash. NB	4	10			0.32	0.54			A	B		
	N. Wash. SB	11	11			0.62/0.89	0.49/0.62			B	B		
	New Chardon EB			12	28			0.60	0.95			B	D
	Sumner Tl NWB			>100	31			1.24	0.93			F	D
	Surface Art. SB			>100	16			1.24/0.66	0.95/0.64			F	C
	Sumner Tl NEB			38	44			0.96	0.95			D	E
	Surface Art. NB			18	37			0.96	1.06			C	D
I-44	**New Sudbury/Surface Artery**												
	New Sudby. EB			9	6			0.67	0.61			B	B
	Surface Art. SB			23	26			0.67	0.61			C	D
I-32	**New Chardon/Congress**												
	New Chardon WB	21	21	46	24	0.60/0.93	0.57/0.84	1.01/1.04	0.69/0.86	C	C	E	C
	Congress NB	33	25	13	23	0.93/0.82	0.69/0.84	0.71/0.97/0.79	0.62/0.52	D	C	B	C
	Merrimac SB	29	26	48	19	0.93/0.48	0.84/0.10	1.04	0.41	D	D	E	C

were completed for the same eight locations for which estimates of Existing (1987) levels and levels in the year 1998 were completed.

Results. The results of this analysis, summarized in Table 4.45, indicate that:

- CO levels in the year 2010 in the vicinity of the Kneeland Street portal of the Dewey Square tunnel with or without the Proposed Action are less than existing (1987) CO levels in the vicinity of the Kneeland Street portal of the Dewey Square tunnel. This is a consequence of the replacement of older vehicles with newer, less polluting vehicles.

- One-hour CO concentrations in ~~1998~~2010 with or without the Artery/Tunnel Project will be less than (in compliance with) the National and Massachusetts AAQS of 35 ppm at all locations analyzed. The maximum 1-hour CO concentration in ~~1998~~2010 with the Artery/Tunnel Project in place (12.5 ppm) was estimated near the intersection of Kneeland Street and Surface Road.

- Eight-hour CO concentrations in ~~1998~~2010 with ~~or without~~ the Artery/Tunnel Project will be less than (in compliance with) the AAQS of 9 ppm at all locations analyzed. The maximum 8-hour CO concentration in ~~1998~~2010 with the Artery/Tunnel Project in place (7.5 ppm) was estimated near the intersection of Kneeland Street and Surface Road.

- CO concentrations in ~~1998~~2010 with the Artery/Tunnel Project were equal to or less than those without the Artery/Tunnel at all of the 8 locations analyzed.

- The results of the air quality analysis for the area surrounding the Dewey square portal for the Proposed Action shows no violation of any applicable ambient air quality standard at existing sensitive receptor locations. However, it is possible that additional development whill be proposed for some of the currently vacant parcels of land directly above or adjacent to the portal area. Prior to developing these parcels, additional air quality studies would be undertaken to ensure that any proposed project is not subject to unacceptable air quality levels.

4.11.2 PM_{10} Levels In The Vicinity Of The Kneeland Street Portal Of The Dewey Square Tunnel.

Estimates were completed of the impact of the reconstruction and change in operation of the Dewey Square Tunnel on PM_{10} levels in the year 2010, the year during which maximum project-related PM_{10} impacts would occur. PM_{10} levels in the year 1998 will be less than PM_{10} levels in the year 2010, since total motor vehicle-related emission rates for PM_{10} are not expected to decrease between the years 1998 and 2010, and since total PM_{10} emissions are directly proportional to the amount of motor vehicle traffic. Motor vehicle traffic in the year 2010 is projected to be substantially greater than that in the year 1998.

Procedures Used To Estimate The Impact Of Emissions From the Kneeland Street Portal On PM_{10} Levels In The Year 2010. The procedures used to estimate the impact of emissions from the reconstruction of the Kneeland Street portal on PM_{10} levels were similar to those used in assessing CO levels in the vicinity of the Kneeland Street portal. PM_{10} emissions from the portal with and without the Proposed Action were developed using the SES model based on the same traffic estimates used for the analysis of CO impacts. However, PM_{10} emissions estimates were completed using the most recent versions of the EPA-PART program, to calculate PM_{10} emissions from tailpipes, brakes, and tire wear, and the EPA "Computation of Air Pollutant Emissions Factors" (AP 42), to estimate PM_{10} emissions from re-entrained road dust. Identical to the analysis of CO impacts, the jet of gas exhausted from the portal was assumed to travel 100 meters (340 feet) before being dispersed downwind. The short term version of the ISC Model was then

Table 4.10

CARBON MONOXIDE BACKGROUND LEVELS
(ppm)

	1987	1998		2010	
		Without Project	With Project	Without Project	With Project
1-hour average	5.0	~~3.0~~ *2.8*	~~3.0~~ *2.8*	~~2.8~~ *3.0*	~~2.8~~ *3.0*
8-hour average	3.0	~~1.8~~ *1.7*	~~1.8~~ *1.7*	~~1.7~~ *1.8*	~~1.7~~ *1.8*

1. Based on average 1-hour and 8-hour CO levels recorded at the DEP CO monitor located in the Charlestown Navy Yard

Source: Bechtel/Parsons Brinckerhoff

Table 4.11

ESTIMATED 1-HOUR AND 8-HOUR WORST CASE CARBON MONOXIDE LEVELS IN 1987 BASED ON MICROSCALE MODELING (ppm)

Analysis Site No.	Location	1-Hour Average Corner	1-Hour Average Midblock	8-Hour Average Corner	8-Hour Average Midblock
1	Charlestown Avenue and O'Brien Highway	23.8	19.7	14.3	11.8
2	City Square	10.8	9.0	6.5	5.4
3	Leverett Circle	22.2	17.0	13.3	10.2
4	Causeway/Merrimac/Lomasney	16.7	11.0	10.0	6.6
5	Causeway and Haverhill Streets	14.2	12.2	8.5	7.3
6	Causeway and Beverly Streets	14.0	12.0	8.4	7.2
7	North Washington and Commercial Streets	26.3	14.2	15.8	8.5
8	New Sudbury and Congress Streets	23.7	13.2	14.2	7.9
9	New Chardon/Haverhill/North Washington	10.8	10.8	6.5	6.5
10	New Chardon/Stillman/North Washington	12.2	9.5	7.3	5.7
11	Hanover and Prince Streets	7.2	7.0	4.3	4.2
12	North Street and Surface Road	18.7	12.7	11.2	7.6
13	Congress and North Streets	19.2	10.3	11.5	6.2
14	Congress and State Streets	19.0	10.3	11.4	6.2
15	State Street and Surface Road	20.0	19.2	12.0	11.5
16	Summer and Purchase Streets	13.7	11.2	8.2	6.7
17	Congress and Purchase Streets	23.2	17.8	13.9	10.7
18	Northern and Atlantic Avenues	16.0	14.8	9.6	8.9
19	Kneeland and Hudson Streets (see Dewey Square Section)	N/A	N/A	N/A	N/A
20	West Broadway/Herald and Albany	18.0	17.7	10.8	10.6
21	Massachusetts Avenue Connector/Southampton	23.8	19.7	14.3	11.8
22	Old Colony and D Street	15.0	8.8	9.0	5.3
23	Broadway and L Street	12.8	9.5	7.7	5.7
24	Northern Avenue and East Service Road	7.0	6.7	4.2	4.0
25	Central Square	7.8	7.2	4.7	4.3
26	East Boston Toll Plaza[1]	20.5	18.7	12.3	~~N/A~~ *11.2*
27	Neptune Road/Bennington and Route 1A	20.0	12.7	12.0	7.6
28	Day Square	8.8	6.8	5.3	4.1
29	Boardman and Route 1A	16.7	12.5	10.0	7.5
30	Bell Circle	19.8	13.0	11.9	7.8
31	East Boston Memorial Stadium Park	7.8	N/A	4.7	N/A
32	New East Boston Toll Plaza	9.2	N/A	5.5	N/A
33	Essex and Washington Streets	15.7	11.7	9.4	7.0
34	Cambridge and Staniford Streets	21.8	19.7	13.1	11.8
35	Summer Street and Atlantic Avenue	12.0	12.7	7.2	7.6
36	Congress Street and Atlantic Avenue	21.2	15.7	12.7	9.4
37	Fargo and D Streets	7.0	6.2	4.2	3.7
38	A Street and Broadway	12.5	N/A	7.5	N/A
39	Third Street North of Railroad Tracks	5.5	N/A	3.3	N/A

1. Maximum concentration of estimates at six receptor locations (see Figure 4.2)
2. 1-hour AAQS = 35 ppm, 8-hour AAQS = 9 ppm
3. N/A: Not applicable
4. All values include 1-hour CO background level of 5.0 ppm, or 8-hour CO background level of 3.0 ppm

Source: Bechtel/Parsons Brinckerhoff

Table 4.13

PEAK DAILY EMISSION BURDENS IN THE STUDY AREA FOR THE YEAR 1987
(tons per day)

Affected Zone	CO	HC	NO_x	PM_{10}
Area North of Causeway				
Highways and Ramps	12.81	3.19	1.0	0.22
Local Streets	11.77	1.94	0.59	0.73
Central Area				
Highways and Ramps	15.01	3.81	1.27	0.2
Covered Highways	3.74	0.93	0.31	0.05
Local Streets	25.85	3.89	1.0	1.37
I-93/I-90 Interchange				
Highways and Ramps	10.51	2.7	0.92	0.19
Covered Highways	0.00	0.00	0.00	0.00
Local Streets	15.21	2.33	0.74	0.83
South Boston				
Highways and Ramps	0.00	0.00	0.00	0.00
Covered Highways	0.00	0.00	0.00	0.00
Local Streets	22.9	3.10	0.93	1.00
East Boston				
Highways and Ramps	2.99	0.83	0.28	0.0
Covered Highways	1.08	~~0.83~~ *0.38*	0.13	0.02
Local Streets	8.3	1.7	0.47	0.75
East Cambridge				
Highways and Ramps	0.00	0.00	0.00	0.00
Local Streets	29.70	4.05	1.13	1.30
Totals	**159.99**	**28.9**	**8.88**	**6.79**

Source: Bechtel/Parsons Brinckerhoff

Table 4.19

PEAK DAILY EMISSION BURDENS IN THE STUDY AREA FOR THE YEAR 1998
(tons per day)

Affected Zone	CO			HC			NO_x			PM_{10}		
	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]
Area North of Causeway												
Highways and Ramps	2.96	2.53	-0.43	0.90	0.89	-0.01	0.55	0.54	-0.01	0.23	0.24	0.01
Local Streets	3.19	3.15	-0.04	0.60	0.59	-0.01	0.35	0.35	0.00	0.78	0.79	0.01
Central Area												
Highways and Ramps	4.72	2.78	-1.93	1.19	0.79	-0.40	0.73	0.48	-0.25	0.28	0.20	-0.09
Covered Highways	1.16	1.55	0.39	0.24	0.54	0.31	0.15	0.33	0.18	0.04	0.10	0.07
Local Streets	8.00	6.69	-1.31	1.48	1.25	-0.23	0.73	0.65	-0.08	1.58	1.45	-0.13
I-93/I-90 Interchange												
Highways and Ramps	3.10	2.65	-0.46	0.80	0.80	-0.01	0.49	0.48	-0.01	0.19	0.20	0.01
Covered Highways	0.00	0.01	0.01	0.00	0.004	0.00	0.00	0.002	0.00	0.00	0.001	0.00
Local Streets	4.52	4.18	-0.34	0.83	0.77	-0.06	0.45	0.44	-0.01	0.94	0.94	-0.01
South Boston												
Highways and Ramps	0.03	0.12	0.09	0.01	0.04	0.02	0.008	0.02	0.01	0.004	0.01	0.01
Covered Highways	0.00	0.64	0.64	0.00	0.25	0.25	0.00	0.15	0.15	0.00	0.05	0.05
Local Streets	5.41	4.57	-0.83	0.99	0.84	-0.15	0.56	0.47	-0.09	1.18	0.99	-0.19
East Boston												
Highways and Ramps	0.87	0.93	0.06	0.25	0.30	0.06	0.15	0.18	0.03	0.06	0.08	0.02
Covered Highways	0.34	0.39	0.05	0.11	0.14	0.04	0.06	0.09	0.02	0.02	0.03	0.01
Local Streets	3.14	2.23	-0.91	0.61	0.43	-0.18	0.33	0.23	-0.10	0.86	0.59	-0.27
East Cambridge												
Highways and Ramps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Streets	9.04	7.55	-1.49	1.64	1.38	-0.26	0.79	0.69	-0.10	1.55	1.37	-0.18
Totals	**46.48**	**39.99**	**-6.48**	**9.65**	**9.02**	**-0.63**	**5.36**	**5.11**	**-0.25**	**7.73**	**7.03**	~~1.67~~ *-0.70*

1. Change = the difference in emissions with/without the project

Source: Bechtel/Parsons Brinckerhoff

Table 4.24

PEAK DAILY EMISSION BURDENS IN THE STUDY AREA FOR THE YEAR 2010
(tons per day)

Affected Zone	CO			HC			NO_x			PM_{10}		
	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]
Area North of Causeway												
Highways and Ramps	3.90	3.19	-0.71	1.03	1.05	0.03	0.59	0.59	0.00	0.26	0.29	0.03
Local Streets	3.61	3.52	-0.09	0.75	0.73	-0.02	0.40	0.40	0.00	~~0.92~~ *0.93*	0.94	0.02
Central Area												
Highways and Ramps	6.30	3.53	-2.77	1.35	0.94	-0.41	0.78	0.54	-0.24	0.32	0.24	-0.08
Covered Highways	1.41	1.93	0.52	0.30	0.64	0.34	0.17	0.36	0.19	0.05	0.12	0.08
Local Streets	8.63	7.42	-1.21	1.84	1.57	-0.27	0.83	0.75	-0.08	1.87	1.72	-0.15
I-93/I-90 Interchange												
Highways and Ramps	3.58	3.51	-0.07	0.86	0.91	0.06	0.50	0.53	0.03	0.20	0.23	0.02
Covered Highways	0.00	~~1.03~~ *0.01*	~~1.03~~ *0.01*	0.00	~~0.38~~ *0.003*	~~0.38~~ *0.00*	0.00	~~0.21~~ *0.00*	~~0.21~~ *0.00*	0.00	~~0.08~~ *0.001*	~~0.08~~ *0.00*
Local Streets	4.71	4.73	0.02	0.98	0.98	0.00	0.49	0.50	0.01	1.06	1.09	0.03
South Boston												
Highways and Ramps	0.02	0.16	0.14	0.01	0.04	0.04	0.004	0.03	0.02	0.002	0.01	0.01
Covered Highways	0.00	1.03	1.03	0.00	0.38	0.38	0.00	0.21	0.21	0.00	0.08	0.08
Local Streets	5.99	5.04	-0.95	1.24	1.04	-0.20	0.64	0.54	-0.10	1.41	1.21	-0.20
East Boston												
Highways and Ramps	1.20	1.22	0.02	0.30	0.39	0.09	0.17	0.22	0.05	0.07	0.10	0.03
Covered Highways	0.36	0.47	0.10	0.11	0.17	0.06	0.06	0.09	0.03	0.02	0.03	0.01
Local Streets	3.43	2.65	-0.79	0.71	0.56	-0.15	0.37	0.27	-0.10	0.99	0.69	-0.30
East Cambridge												
Highways and Ramps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Local Streets	8.96	7.28	-1.67	1.92	1.55	-0.37	0.84	0.72	-0.12	1.74	1.52	-0.23
Totals	**52.09**	**45.67**	**-6.41**	**11.38**	**10.95**	**-0.44**	**5.87**	**5.77**	**-0.10**	**8.91**	**8.26**	~~2.39~~ *-0.65*

1. Change = the difference in emissions with/without the project

Source: Bechtel/Parsons Brinckerhoff

Table 4.25

ANNUAL EMISSION BURDENS IN THE STUDY AREA FOR THE YEAR 2010
(tons per year)

Affected Zone	CO			HC			NO_x			PM_{10}		
	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]	Without Project	With Project	Change[1]
Area North of Causeway												
Highways and Ramps	1,289	1,054	-235	340	349	9	197	197	0	85	95	10
Local Streets	1,196	1,165	-31	247	240	-7	134	133	-1	306	312	5
Central Area												
Highways and Ramps	2,084	1,168	-916	~~446~~	310	-136	260	179	-81	104	78	-26
Covered Highways	466	638	173	98	~~21~~ *211*	~~14~~ *114*	56	119	63	16	41	25
Local Streets	2,855	2,455	-400	610	520	-91	275	248	-27	617	568	-49
I-93/I-90 Interchange												
Highways and Ramps	1,184	1,161	-24	~~293~~ *283*	302	19	165	175	11	68	75	7
Covered Highways	0	5	5	0	2	2	0	1	1	0	0.3	0
Local Streets	1,558	1,566	8	323	324	1	162	166	3	352	362	10
South Boston												
Highways and Ramps	6	51	46	2	15	13	1	9	7	1	4	3
Covered Highways	0	340	340	0	125	125	0	69	69	0	25	25
Local Streets	1,983	1,667	-315	409	344	-66	211	179	-32	466	399	-67
East Boston												
Highways and Ramps	398	404	6	98	128	30	57	73	16	24	34	11
Covered Highways	121	155	34	37	56	19	21	31	10	7	11	4
Local Streets	1,136	876	-260	236	185	-51	123	~~0~~ *90*	-33	327	228	-99
East Cambridge												
Highways and Ramps	0	0	0	0	0	0	0	0	0	0	0	0
Local Streets	2,964	2,411	-553	637	~~415~~ *514*	-123	279	238	41	578	503	-75
Totals	**17,240**	**15,117**	**-2,123**	**3,768**	**3,624**	**-144**	**1,942**	**1,909**	**-33**	**2,950**	**2,734**	**-216**

1. Change = the difference in emissions with/without the project

Source: Bechtel/Parsons Brinckerhoff

Table 4.33

MAXIMUM 1-HOUR NO_x GROUND LEVEL CONCENTRATIONS IN THE VICINITY OF PROPOSED VENTILATION BUILDINGS

Class	Maximum NO_2 Background	Maximum NO_x From			
		Vent 1	Vent 5	Vent 6	Vent 7
A (extremely unstable)	84.5	9.1	10.9	13.5	19.7
B (moderately unstable)	301	9.1	10.9	16.3	20.6
C (unstable)	375.4	10.6	11.8	25.0	32.1
~~C~~ *D* (neutral)	244	14.0	15.0	~~26.8~~ *28.6*	37.2
E (moderately stable)	219.6	30.7	41.5	39.4	49.1
F (extremely stable)	199	29.9	47.3	49.9	53.3

1. The DEP 1-hour NO_2 policy guideline is 320 micrograms per cubic meter
2. NO_2 background concentration is the highest 1-hour concentration value recorded at the Bremen Street monitoring station during the period 1985 through 1987. The first and second maxima measured during 1988 were much lower than those measured during 1985 through 1987.

Source: Bechtel/Parsons Brinckerhoff

Table 4.34

CONCURRENT BACKGROUND NO_2 AND O_3 CONCENTRATIONS FOR THE BOSTON AREA

Stability Class	NO_2 (ppm)	O_3 (ppm)
A	0.045	0.038
	0.033	0.065
	0.033	0.055
	0.032	0.061
B	0.160	0.004
	0.100	0.014
	0.100	0.011
	0.096	~~0.016~~ *0.017*
C	0.200	0.001
	0.117	0.000
	0.106	0.022
	0.101	0.016
D	0.130	0.001
	0.112	0.012
	0.104	0.007
	0.090	0.095
E	0.117	0.002
	0.113	0.003
	0.110	0.003
	0.104	0.003
F	0.106	0.001
	0.105	0.009
	0.104	0.003
	0.103	0.004

1. Four highest NO_2 data measured at Bremen Street from 1985 through 1987
2. Concurrent O_3 data measured at Chelsea from 1985 through 1987
3. The first and second maxima measured at Bremen Street during 1988 were 0.121 ppm (227 ug/m^3) and 0.117 ppm (220 ug/m^3). These volumes are much lower than the first and second maxima reported in this table.

Source: Bechtel/Parsons Brinckerhoff

Table 4.36

SECOND-HIGHEST HOURLY TOTAL NO_2 CONCENTRATIONS BY WIND DIRECTION RESULTING FROM EMISSIONS FROM VENTILATION BUILDING 3, BOSTON EDISON SITE BASED ON THE RESULTS OF PHYSICAL MODELING

Year	Wind Direction	Maximum 1-Hour NO_x Concentration From Vent Bldg. 3 Alone[1] (ug/m^3)	Second-Highest 1-Hour Total NO_2 Concentration[2] (ug/m^3)
1998	N	2.7	182
	NNE	9.6	218
	NE	34.4	197
	ENE	49.1	171
	E	25.1	167
	ESE	51.2	199
	SE	43.3	~~213~~ *214*
	SSE	17.4	175
	S	18.2	203
	SSW	18.7	184
	SW	6.2	~~192~~ *191*
	WSW	2.0	161
	W	4.3	~~192~~ *191*
	WNW	2.4	302
	NW	7.9	195
	NNW	11.6	165
2010	N	3.0	184
	NNE	10.8	218
	NE	38.5	201
	ENE	55.0	175
	E	28.1	169
	ESE	57.4	205
	SE	48.5	218
	SSE	19.4	176
	S	20.4	~~201~~ *203*
	SSW	20.9	~~182~~ *184*
	SW	7.0	~~192~~ *193*
	WSW	2.2	161
	W	4.9	~~192~~ *191*
	WNW	2.8	~~303~~ *302*
	NW	8.8	197
	NNW	13.0	167

1. Maximum NO_x concentrations based on the results of wind tunnel testing assuming an exhaust air exit velocity of 1,600 feet per minute (fpm) at an exhaust duct height of 240 feet

2. Total NO_2 concentration based on application of the ozone limiting method to the contribution from the ventilation building emissions and background levels monitored during 1985, 1986, and 1987 at the DEP Bremen Street monitoring station

Source: Bechtel/Parsons Brinckerhoff

Table 4.37

SECOND-HIGHEST HOURLY TOTAL NO_2 CONCENTRATIONS BY WIND DIRECTION RESULTING FROM EMISSIONS FROM VENTILATION BUILDING 4, PARCEL 7 SITE BASED ON THE RESULTS OF PHYSICAL MODELING

Year	Wind Direction	Maximum 1-Hour NO_x Concentration From Vent Bldg. 3 Alone[1] (ug/m^3)	Second-Highest 1-Hour Total NO_2 Concentration[2] (ug/m^3)
1998	N	22.3	199
	NNE	29.4	220
	NE	19.5	184
	ENE	44.0	171
	E	5.2	150
	~~SE~~ *ESE*	16.1	171
	~~ESE~~ *SE*	26.2	~~199~~ *201*
	SSE	14.1	173
	S	11.0	201
	SSW	17.5	188
	SW	21.8	~~207~~ *206*
	WSW	35.7	~~192~~ *191*
	W	22.7	203
	WNW	6.0	304
	NW	19.1	205
	NNW	11.0	165
2010	N	25.9	201
	NNE	34.1	220
	NE	22.7	~~184~~ *188*
	ENE	51.0	171
	E	5.9	150
	~~SE~~ *ESE*	18.4	173
	~~ESE~~ *SE*	30.5	203
	SSE	16.4	175
	S	12.8	201
	SSW	20.2	191
	SW	25.3	~~206~~ *208*
	WSW	41.3	~~192~~ *191*
	W	~~26.4~~ *26.3*	203
	WNW	7.0	306
	NW	22.2	208
	NNW	12.8	167

1. Maximum NO_x concentrations based on the results of wind tunnel testing assuming an exhaust air exit velocity of 1,600 feet per minute (fpm) and an exhaust duct height of 240 feet

2. Total NO_2 concentration based on application of the ozone limiting method to the contribution from the ventilation building emissions and background levels monitored during 1985, 1986, and 1987 at the DEP Bremen Street monitoring station

Source: Bechtel/Parsons Brinckerhoff

Table 4.38

MAXIMUM 1-HOUR AND 8-HOUR CO CONCENTRATIONS AT GROUND-LEVEL AND ELEVATED RECEPTOR LOCATIONS IN THE VICINITY OF PROPOSED VENTILATION BUILDINGS BASED ON ANALYTICAL (ISCST) MODELING RESULTS

Year	Vent Building No.	Location	Ground-Level Receptor Concentrations: Maximum 1-Hour[1] (ppm)	Ground-Level Receptor Concentrations: Maximum 8-Hour[2] (ppm)	Elevated Receptor Location	Elevated Receptor Concentrations: Maximum 1-Hour[1] (ppm)	Elevated Receptor Concentrations: Maximum 8-Hour[2] (ppm)
1998	1	Near Fort Point Channel	3.00	1.85	Wang Building Fresh Air Intake	3.34	2.10
	3	Boston Edison	2.95	1.81	125 High Street Building Roof	3.80	2.44
	4	Parcel 7	3.38	2.03	JFK Federal Building Roof	4.91	2.91
	5	Commonwealth Flats	3.10	1.87	N/A	N/A	N/A
	6	Near Subaru Pier	3.11	1.85	N/A	N/A	N/A
	7	Near Bird Island Flats	3.11	1.86	N/A	N/A	N/A
2010	1	Near Fort Point Channel	3.23	1.99	Wang Building Fresh Air Intake	3.64	~~2.22~~ *2.31*
	3	Boston Edison	3.22	1.94	125 High Street Building Roof	4.46	2.72
	4	Parcel 7	3.85	2.21	JFK Federal Building Roof	6.11	3.29
	5	Commonwealth Flats	3.41	2.05	N/A	N/A	N/A
	6	Near Subaru Pier	3.43	2.07	N/A	N/A	N/A
	7	Near Bird Island Flats	3.45	2.10	N/A	N/A	N/A

1. All values include 1-hour CO background levels of 2.8 ppm. (1998) and 3.0 ppm (2010)
2. All values include 8-hour CO background levels of 1.7 ppm. (1998) and 1.8 ppm (2010)
3. 1-hour CO AAQS = 35 ppm
4. 8-hour CO AAQS = 9 ppm
5. N/A: Not applicable; no relevant elevated receptor locations

Source: Bechtel/Parsons Brinckerhoff

Table 4.45

SOUTHERN PORTAL OF DEWEY SQUARE TUNNEL ESTIMATED ONE-HOUR AND 8-HOUR WORST CASE CARBON MONOXIDE LEVELS IN 2010 WITH AND WITHOUT THE PROPOSED ACTION (ppm)

Receptor Site No.	Location	Without Proposed Action 1-Hour	Without Proposed Action 8-Hour	With Proposed Action 1-Hour	With Proposed Action 8-Hour
1	Hudson and Kneeland Streets (NE Corner)	~~11.8~~ *12.5*	~~7.1~~ *7.5*	9.0	5.4
2	Surface and Kneeland Streets (NW Corner)	~~14.5~~ *15.5*	~~8.7~~ *9.2*	12.5	7.5
3	Kneeland Street (Monitor)	~~6.2~~ *6.5*	~~3.7~~ *3.9*	6.0	3.6
4	Kneeland Street Midblock	8.8	5.3	7.5	4.5
5	Surface Street Midblock	~~14.5~~ *15.0*	~~8.7~~ *9.0*	7.7	4.6
6	Hudson and Harvard Streets	~~11.0~~ *12.2*	~~6.6~~ *7.3*	6.0	3.6
7	Hudson Street Midblock	~~7.2~~ *7.5*	~~4.3~~ *4.5*	5.0	3.0
8	Hudson and Oak Street	~~7.2~~ *7.5*	~~4.3~~ *4.5*	7.3	4.4

1. One-hour AAQS for Carbon Monoxide = 35 ppm
2. One-hour values include CO background level of 3.0 ppm
3. Eight-hour AAQS for CO = 9 ppm
4. Eight-hour values include CO background level of 1.8 ppm

Source: Bechtel/Parsons Brinckerhoff

Table 4.46

SOUTHERN PORTAL OF DEWEY SQUARE TUNNEL ESTIMATED 24-HOUR AND ANNUAL WORST CASE PM_{10} LEVELS IN 2010 WITH AND WITHOUT THE PROPOSED ACTION (mg/m^3)

Receptor No.	Location	24 Hour Portal Contribution Without Proposed Action	24 Hour Portal Contribution With Proposed Action	24 Hour Background Levels	Annual Portal Contribution Without Proposed Action	Annual Portal Contribution With Proposed Action	Annual Background Levels
1	Hudson and Kneeland Streets (NE Corner)	~~9.1~~ *22.9*	~~2.6~~ *5.6*	64	~~3.7~~ *3.9*	2.2	30
2	Surface & Kneeland Streets (NW Corner)	~~13.2~~ *33.1*	~~3.3~~ *7.2*	64	5.3	2.2	30
3	Kneeland Street (Monitor)	~~6.0~~ *14.9*	~~2.6~~ *5.6*	64	3.2	~~4.0~~ *4.1*	30
4	Kneeland Street Midblock	~~8.2~~ *20.5*	~~2.8~~ *6.3*	64	~~3.2~~ *3.4*	~~2.1~~ *2.0*	30
5	Surface Street Midblock	~~7.2~~ *18.1*	~~2.6~~ *6.0*	64	2.4	~~1.7~~ *1.6*	30
6	Hudson & Harvard Streets	~~17.2~~ *43.1*	~~7.8~~ *17.6*	64	6.6	~~6.4~~ *6.1*	30
7	Hudson Street Midblock	~~4.6~~ *13.2*	~~6.5~~ *16.7*	64	1.2	~~4.4~~ *4.1*	30
8	Hudson & Oak Streets	~~5.7~~ *14.2*	~~12.1~~ *29.2*	64	~~1.1~~ *1.2*	~~10.8~~ *9.4*	30

1. 24 Hour AAQS for PM_{10} = 150 ug/m^3
2. Annual AAQS for PM_{10} = 50 ug/m^3
3. PM_{10} background values are based on the average 2nd highest levels recorded at DEP monitoring stations between 1986 and 1988

Source: Bechtel/Parsons Brinckerhoff

Table 4.53

MAXIMUM PREDICTED CONCENTRATIONS OF AIR TOXICS IN 2010 WITH AND WITHOUT PROPOSED ACTION FOR VENTILATION BUILDING 7 SURROUNDING AREA (ppb)

Period	Pollutant Species	Without Project	With Project: Ventilation Building Contribution	With Project: Surface Roadway Contribution	Change[1]	MAAL[2]	EPA Criteria
Annual	~~0.865~~ *Benzene*	~~0.017~~ *0.865*	~~0.770~~ *0.017*	~~-0.078~~ *0.770*	~~0.04~~ *-0.078*	~~0.12~~ *0.04*	*0.12*
	Toluene	1.493	0.032	1.329	-0.132	2.72	7000
	Ethylbenzene	0.275	0.003	0.245	-0.027	27.21	350
	Xylenes	1.100	0.030	0.979	-0.091	2.72	1050
	Acetaldehyde	0.075	0.003	0.067	-0.005	0.18	--
	1,3 Butadiene	0.063	0.002	0.056	-0.005	0.002	0.0036
	Cyclohexane	0.224	0.005	0.195	-0.024	81.63	--
	Formaldehyde	0.244	0.010	0.214	-0.020	0.06	0.08
24 Hour	~~1.81~~ *Benzene*	~~0.26~~ *1.81*	~~1.61~~ *0.26*	~~0.06~~ *1.61*	~~0.54~~ *0.06*	*0.54*	--
	Toluene	5.82	0.50	5.18	-0.14	2.72	--
	Ethylbenzene	1.22	0.05	1.08	-0.09	27.21	--
	Xylenes	3.97	0.47	3.53	0.03	2.72	--
	Acetaldehyde	0.303	0.053	0.270	0.020	2.72	--
	1,3 Butadiene	0.224	0.031	0.199	0.006	0.54	--
	Cyclohexane	0.927	0.074	0.825	-0.028	81.63	--
	Formaldehyde	1.310	0.160	1.170	0.02	0.27	--

1. Difference between proposed action and without project
2. Massachusetts Acceptable Ambient Limit guideline
3. EPA toxic assessment guidelines: for non-carcinogens, Reference Dose Concentrations; for carcinogens, 1 chance in a million lifetime inhalation risk

Source: Bechtel/Parsons Brinckerhoff

Consequently, the only reasonably available abatement measures consist of erecting noise barriers within the right-of-way or providing noise insulation for public use or nonprofit institutional structures in critical areas where the project noise levels approach or exceed the relevant FHWA noise abatement criteria. Noise abatement measures should provide a substantial reduction in noise levels, should be cost effective, and should be implementable in a practical manner without limiting accessibility.

5.3.1 Noise Barrier Analyses

The amount of noise reduction that a noise barrier can achieve and the cost of a barrier are two factors in determining noise barrier feasibility. To be considered effective, a barrier should reduce noise by approximately 10 dBA or, if this reduction is not achievable, it should reduce the noise to levels below the noise abatement criteria. The Department uses the concept of cost per decibel reduction per dwelling unit, i.e., a barrier costing approximately $2,400 or less per dBA reduction per dwelling unit is considered practical. In this analysis, it is assumed that the cost of a barrier is $14 to $17 per square foot. Noise barriers have been considered where the total projected traffic noise levels approach or exceed the relevant FHWA NAC at all sites with external use, except sites 13, 29B, and 37. (At these three sites there will be no noise impact.)

The following addresses the feasibility and reasonableness of placing noise barriers at all Category B sites where projected noise levels approach or exceed the NAC of 67 dBA. Noise barriers are recommended at sites 10, 11, ~~17,~~-30, 36, ~~45~~-46 and 47.

5.3.1(a) Area North Of Causeway Street

Except at site 29B (swimming pool northwest of Storrow Drive), Proposed Action noise levels at all of the other sites in this area will approach or exceed FHWA NAC of 67 dBA. Feasible and reasonable mitigation measures are considered for each location in this area.

At receptor sites 18 (Paul Revere Landing Park), 27 (Charles River Building), 28 (Paul Revere Landing Park), and 42 (south bank of the Charles) the project noise levels would exceed NAC by 1 to 10 dBA. Noise barriers were considered at these sites. At site 18 (Paul Revere Landing Park, North Bank), the project noise levels show an increase of 4 dBA relative to the future baseline noise levels. Also, the predominant noise sources are traffic on I-93 and the Charlestown bridge, both of which are more than 200 feet away from the site. In addition, the above roads are 20 to 75 feet higher in elevation than the receptor site. Barriers at such heights and distances are not acoustically effective. Barrier analysis for this site shows that only a meager 5 dBA reduction is attainable even with a 14-foot-high barrier on all roadways (I-93 north- and southbound and the Charlestown bridge) (see Figure 5.3). Each of the three barriers would be at least 1,000 feet long and 14 feet high. Estimated cost of the three barriers is $680,000. Barriers are not recommended for this site because they are neither reasonable nor feasible.

At sites 27 and 28 (Charles River Building and Paul Revere Landing Park, South Bank), Proposed Action noise levels would be in the range of 66-70 dBA. However, the noise levels at the two sites are less than future baseline noise levels and are generated by both north- and southbound lanes of I-93. In the vicinity of these receptors, the Central Artery emerges from a tunnel at Causeway Street and continues on an elevated section reaching a height of 40 feet above these receptors. A 9- to 10 dBA noise reduction is achievable at receptor site 28, with a 1,000-foot-long and 20-foot-tall barrier on the elevated Central Artery. However, noise levels at receptor site 27 would be reduced by only 7 dBA with the barrier, therefore not meeting the 10 dBA reduction criterion (see Figure 5.3). At an estimated cost of $340,000, a massive barrier of these dimensions on an elevated section is not considered feasible and therefore not proposed.

At sites 17, 45, and 46, Proposed Action noise levels would be 6 to 9 dBA above FHWA NAC levels. The sites represent residential land use with usable external areas for recreation and

outdoor activities. Noise barriers were considered along New Rutherford Avenue from Harvard Street to Austin Street to reduce the project noise levels by 10 dBA. The barriers are V-shaped to allow access to New Rutherford Avenue from the intersecting side streets. At a height of 16 feet for a total length of approximately 1,600 feet, the barriers would cost approximately $440,000. However, this mitigation measure is not considered reasonable because of the following reasons. Residential buildings on Harvard Street (Locations 17 and 45) are generally three stories high and have no external noise sensitive land use. Furthermore, these tall building will not be fully shielded by the 16 foot tall barrier.

Other residential buildings along New Rutherford Avenue, between Old Rutherford Avenue and Austin Street, have usable external areas and thus would also require mitigation. The following mitigation measures are recommended for these 2 areas. For the external facades of the residences which are located on Harvard Street within 200 feet of New Rutherford Avenue (locations 45 and 4717) inoperable windows are recommended to provide adequate sound insulation and to satisfy the FHWA indoor Noise Abatement Criterion of 52 dBA. For residences along New Rutherford Avenue, between old Rutherford Avenue and Austin Street (Location 46), a barrier/earth berm combination is recommended (see Figure 5.3) to reduce the noise levels by approximately 10 dBA. A 700-foot-long, 8-to-10 foot tall, fully landscaped earth berm would be built in the middle section at an estimated cost of $200,000. A short berm 3 to 4 feet tall already exists in the middle part of this segment. In addition to the earth berm, a 500-foot-long 16-foot-tall noise barriers would be built one on each end of the earth berm at an approximate total cost of $270,000. A retaining wall already exists north of the proposed berm.

At site 47 (Bunker Hill Community College), Proposed Action noise levels would be 5 to 6 dBA above FHWA NAC levels. This site represents an institutional land use and would need mitigation. A 10 dBA reduction would be achieved at receptor site 47, with a 1,000-foot-long, 20-foot-tall barrier as shown in Figure 5.3. At an estimated cost of $270,000 this barrier would be cost-effective and is recommended.

Receptor sites 39 through 44 are located in noise sensitive areas, representing pedestrian and recreational uses along the Charles River bank. Proposed Action noise levels would be 1 to 10 dBA higher than the noise abatement criterion level of 67 dBA. Also, the Proposed Action noise levels would be 2 to 10 dBA higher than existing and future baseline noise levels. A reduction of approximately 5 to 7 dBA could be achieved with practical height (20 feet) structural barriers constructed on the outer north and southbound loops of the CANA ramps, on the old Charles River dam (O'Brien Highway), and on I-93 (see Figure 5.3). Greater than 5 to 7 dBA reduction would not be possible with such barriers because of the complicated geometry and heights of the stacked viaducts with large open areas between them and the large area around the loops that needs to be shielded. Construction of the noise barriers will be reviewed and a decision will be made during the design phase with input from the MDC, Citizens Advisory Committee and Charlestown North Area Task Force.

A practical and reasonable solution would be to shield pedestrian areas by extensive landscaping which would include trees, shrubs, berms and isolated standing walls to create a serene type of environment. Strategically placed freestanding walls and other objects in the pedestrian areas would provide noticeable reduction in noise levels. Pedestrian walkways near the viaducts could be provided with transparent enclosures commonly seen on walkways leading to idling aircraft in most airports.

5.3.1(b) Central Area

Receptor sites 15, 16, and 25 [Waterfront (Columbus) Park] are in the same general area. At sites 15 and 25, the Proposed Action noise levels are perceptibly lower than the future baseline noise levels. At site 16 the Proposed Action would increase the noise level by 3 dBA relative to the future baseline noise level. A reduction of 9 dBA can be achieved at all three sites with a 12-

7.2.1 Metropolitan Economic Forecasts

This section describes various growth forecasts for the metropolitan area (NECMA) and the study area that form the background for the economic modeling and impact analyses for the year 2010. The various sources that provided data for the impact analyses and the regional economic model are also described. The basic economic forecasts described here implicitly assume that the level of service for vehicular movement to and through central Boston for the year 2010 is maintained at levels no worse than current conditions. For purposes of the impact analysis, these forecasts are considered achievable with completion of the proposed project, while a somewhat lower economic growth rate is likely without the proposed project (i.e., 2010 baseline conditions).

7.2.1(a) Population And Employment Forecasts

Total population of the New England County Metropolitan Area was estimated at 3.70 million in 1987, and is forecast to grow to 4.3 million by 2010, a total increase of 15 percent in 23 years. If current City of Boston policies regarding housing development continue to be successful, this growth will occur partly within the City and predominately in the distant suburbs, while the ring of inner suburbs that make up the MAPC region remains at a relatively stable population of around 2.9 million.

As a baseline for regional modeling in this study, employment in the NECMA is forecast to grow from approximately 2.1 million in 1986 to nearly 3.0 million in 2010, an increase of approximately ~~20~~ 43 percent. Suffolk County employment is forecast to grow from 642,000 to 774,000 over this same period (see Table 7.18). The forecast employment growth is dependent upon growth of sufficient population to supply the necessary labor force. These are nevertheless conservative forecasts, as they are less than the year 2010 employment projections of 3.2 million for the NECMA and 794,000 for Suffolk County, which have been issued by the BRA. The NECMA metropolitan area growth forecast used here is only slightly greater than the 19 percent growth in employment over the same period forecast by the MAPC for its smaller regions.

A conservative estimate is appropriate because the long-term benefits of the Artery/Tunnel Project depend on estimates of the future economic growth that can occur if the highway system function is maintained in central Boston. Thus, more conservative economic growth forecasts will lead to more conservative estimates of project impacts, which is deemed to be a precedent and appropriate perspective for this study.

Study Area Forecast Methodology. A detailed building area forecast (referred to in this study as the land use survey) was developed for the study area based on the survey described in Section 7.1. A catalog of all known development projects was reviewed with local area experts of the BRA and the Cambridge Community Development Department in order to estimate the likelihood that each project would be completed and to determine the most likely final project sizes and completion dates. Additional potential development sites were identified (referred to as "build-out" capacity), and the overall capacity for development of each subarea was evaluated in meetings with the BRA and other planning experts. Finally, probabilities of completion by 1995 and 2010 were assigned to the various projects as a function of their status (underway, in review, in planning, proposed, build-out). These probabilities and the square footage of the individual projects were used to estimate future development for the years 1995 and 2010. Conversions were taken into account as redistributions among the categories of land use, resulting, for example, in an increase in office space and a decrease in industrial space after an industrial-to-office conversion.

This forecast represents a consensus of the expectations of the development community in the study area and is subject to change if there are significant future changes in economic conditions. A lower rate of regional economic growth would result in delays and cancellations of some projects, possibly shifting some growth forecast by 1995 to the later period and delaying the achievement of levels forecast for 2010 by a few years. However, eventual land use can be

Table 8.6

LAND USE IMPACTS IN AREA NORTH OF CAUSEWAY STREET

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf) Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	Impacts/Mitigation
1	Comm. of Mass. (MDPW)	Office/parking	*F*					Loss of 290 parking spaces; building acquired and tenants relocating
2	Comm. of Mass. (MDC)	Parking	P			57,400		Loss of 143 parking spaces, mitigation under discussion
3	Comm. of Mass. (MDPW)	Undeveloped highway ROW						No change in land use
4	Comm. of Mass. ~~(Millers River)~~	*Millers River*		62,080				~~No change in land use~~ *Footings and piers in river; mitigation under discussion*
5	City of Boston	Beverly Street parking	P	27,000				Street to be discontinued; loss of 15 parking spaces; necessary access will be provided
6	Mass. General Hospital Corp.	Parking	P					No long-term impacts
7	MBTA	RR tracks	P			3,900		May affect future air-rights development; mitigation under discussion
8	~~Comm. of Mass. (MDPW)~~ *Boston & Maine Corp.*	Highway ROW	*P*			12,600		
9	Boston Sand & Gravel Co.	Highway, sand/gravel bus*iness*	P			102,400		Impacts uncertain at this time; mitigation under discussion.
10	MBTA	Railroad tracks	P			17,700		No impact to MBTA operations
11	Comm. of Mass. (MDC)	~~Millers~~ *Charles* River	P			95,400		River to be affected by overhead highway elements; mitigation under discussion
12	Boston Sand & Gravel Co.	Sand/gravel bus*iness*	P			35,400		Impacts uncertain at this time; mitigation under discussion
13	MBTA	Railroad tracks	P					No impact to MBTA operations
14	Comm. of Mass. (MDPW)	Highway (proposed)						Loss of 31 parking spaces
15	Boston & Maine Corp.	Wholsale/undeveloped	P			28,400		Loss of 65 parking spaces; other impacts uncertain at this time
16	Comm. of Mass. (MDC)	Sewer plumbing/ chlorine station	P			31,900		Some loss of parking but no impact to operations
17	Boston & Maine Corp.	Industrial uses	P			77,800		Impacts uncertain at this time; building owned by MDPW
18	Comm. of Mass. (DCPO)	Parking	P	5,100				Loss of 72 parking spaces; mitigation under discussion

Table 8.6 (Cont.)

LAND USE IMPACTS IN AREA NORTH OF CAUSEWAY STREET

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf) Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	Impacts/Mitigation
19	Comm. of Mass. (MDC)	Lomasney Way	F	15,251				Street to be discontinued
20	Comm. of Mass. (MDC)	Leverett Circle/MBTA Station	P	27,900				No long-term impacts; landscaping will be improved
21	MBTA	Railroad track ROW	P			10,000		No impact to MBTA operations
22	MBTA	Access road	P			4,000		No impact to access
23	Chas River Park 'A' Comp	Residential/landscape	P	10,000				Will not affect land use
24	Whittier Place Condo Trust	Residential/landscape	P	6,200				Will not affect land use
25	Comm. of Mass. (MDC)	Pedestrian bridge	P	1,200				No impact to pedestrian bridge
26	Chardon Realty Trust	Parking/wharf	P	35,300				Loss of 100 parking spaces; potential ferry landing; mitigation under discussion
27	Boston Thermal Energy Corp.	Steam plant	P					No long-term impacts; ice house to be removed
28	Comm. of Mass. (MDPW)	Highway/maintenance						No change in land use
29	Comm. of Mass. (MDPW)	Highway/maintenance						No change in land use
30	Comm. of Mass. (MDC)	Police station/parking	P	800				Small taking; won't affect land use
31	Comm. of Mass. (MDC)	Pedestrian bridge	P	2,700				No impact to pedestrian bridge
32	Comm. of Mass. (MDPW)	Highway						No change in land use
33	Comm. of Mass. ~~(Millers River)~~	*Millers River*		47,950				Footings and piers in river; mitigation under discussion
34	Comm. of Mass. (MDPW)	State highway						No change in land use

1. * Uncertain at this time whether area noted will be a taking in fee or an underground/overhead highway easement. Extent of acquisition, partial (P) or full (F) also uncertain at this time.

Source: Bechtel/Parsons Brinckerhoff

Table 8.7

LAND USE IMPACTS IN CENTRAL AREA

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf) Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	Impacts/Mitigation
1	City of Boston	Parking	P		53,300			~~Loss of 74~~ *186* parking spaces *impacted* ~~(out of 186 total)~~
2	Comm. of Mass. (MDPW)	Pump house						**
3	City of Boston	Parking	P		28,500			Loss of 150 parking spaces**
4	City of Boston	Parking/leased to MBTA for construction staging	P		9,900			~~No impact at this time~~ *To be used for surface roadway*
5	BRA	Vacant	P		5,300			To be used for surface roadway
6	MBTA	Railroad track area	P		5,300			No impact to MBTA operations
7	City of Boston	Parking	P		116,000			Loss of 207 parking spaces**
8	Comm. of Mass. (MDPW)	Pump house						**
9	Peter and Vito Cucchiara, Lisa Realty Trust Trustees	Vacant	P		100			No impact at this time
10	City of Boston	Parking	F		721			*Loss of parking spaces***
11	City of Boston	Parking	P		1,900			Loss of 10 parking spaces**
12	City of Boston	Parking	F		6,200			Loss of 63 parking spaces**
13	City of Boston	Parking	F		18,280			Loss of 65 parking spaces**
14	City of Boston	*Parking*	P		3,400			**
15	Comm. of Mass. (MDPW)	Parking	F				58,023	Loss of 150 parking spaces; vent building location to include replacement parking, food market and MBTA station entrance; acquired pursuant to agreement with BRA
16	Boston Edison Co.	Substation	P				26,300	Loss of 203 parking spaces; vent building location; station to remain on site; future development will be restricted**
17	Mass. Turnpike Authority	Tunnel portal	P					Existing land use will not change
18	City of Boston	Grass strip	P		9,200			**
19	James F. Sullivan, DS Parking Trust Trustee	Parking garage	P		400			No impact at this time
20	Mass. Turnpike Authority	Tunnel portal	P					Existing land use will not change
21	City of Boston	Undeveloped	P		49,000			**

Table 8.8 (Cont.)

LAND USE IMPACTS IN I-93/I-90 INTERCHANGE AND MASSACHUSETTS AVENUE INTERCHANGE AREA

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf) Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	Impacts/Mitigation
17	240 Southampton St., Inc.	Vacant	P	4,950				Impacts uncertain at this time
18	MBTA	Railroad ROW	F	35,509				No impacts to existing operations
19	John Sax	Vacant	F	7,037				Total taking
20	City of Boston	Abandoned incinerator	P	20,100				No impacts
21	Comm. of Mass.	Fort Point Channel						No impacts
22	S Fatles, Trustee, Moore St. Realty Trust		P	3,100				Impacts uncertain at this time
23	J.A. and J.S. Gnazzo	Auto paint shop	F	16,000				Existing business to receive relocation benefits
24	S & L Fruman TC	Wholesale	F	14,800				Existing business to receive relocation benefits
25	S & L Fruman TC	Private way	F	5,400				Existing business to receive relocation benefits
26	S & L Fruman TC	Vacant/access	P	34,700				Impacts uncertain at this time
27	P.J. Kennedy & Sons, Inc.	Plumbing supply	P	7,800				Impacts uncertain at this time
28	BRA	Parking/access	P	4,500				Permanent impacts to parking facility; mitigation under discussion
29	A. and M. Jacobson, Trustees, Industrial Wholesale Florist/ Supplier	Parking	P	29,500				Loss of parking spaces; mitigation under discussion
30	Boston Flower Exchange Inc.	Parking	P	3,500				No impact to existing bus; loss of 30 parking spaces
31	City of Boston	Parking	P	47,400				Impact and mitigation to be determined in conjunction with #28 above
32	MBTA	Railroad ROW	P	18,500		2,000		No impact to existing operations
33	Owner unknown	Moore St. (private way)	F	7,500				No impacts to existing surrounding land uses; roadway to be relocated
34	Comm. of Mass.	Waterway (Fort Point Channel)						No impact to existing use
35	U.S. Postal Service	~~Vacant/~~Private roadway*/Postal operations*	P	95,350				Vent building location; impact to operations and mitigation under discussion
36	Penn Central Transportation Co.	Railroad ROW	P					Railroad tracks to be relocated in conjunction with 10 above

Table 8.9

LAND USE IMPACTS IN SOUTH BOSTON/SOUTH BOSTON BYPASS ROAD AREA

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf)				Impacts/Mitigation
				Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	
1	The Gillette Co.	~~See table 8.8, #4~~ *Parking/Underground storage tank*	P		84,100			
2	The Boston Wharf Co.	Parking	P		148,000			Future development will be restricted over tunnel box; mitigation under discussion
3	Comm. of Mass. (MDPW)	Parking						No long-term impacts; parking operation acquired for Proposed Action
4	Comm. of Mass. (MDPW)	Seafood processing	F	14,500				Former existing business to receive relocation benefits
5	M. Leonard Lewis	Parking	F		~~22,570~~ *57,456*			Future development may be restricted; mitigation under discussion
6	U.S. Postal Service	Parking	P				204,890	Loss of 392 parking spaces and potential development of site will be restricted; mitigation under discussion regarding ability to provide replacement parking
7	Broderick Northern Realty Trust	Vacant/parking	F	49,407				Future vent building site; business entitled to relocation benefits; loss of 25 parking spaces
8	Owner unknown	Congress St. (private way)	F	20,725				Congress St. to be relocated
9	The McCourt Co., Inc	Vacant	P	205,975				Impacts to potential development due to infrastructure improvements
10	New England Seafood Center Association	Seafood processing	P	6,978				No impacts to existing operations
11	N.J. and K.N. Contos	Vacant/parking	F	42,608				~~Future vent building site~~ *Required for Congress St. relocation*; loss of 124 parking spaces; business entitled to relocation benefits
12	Comm. of Mass. (MDPW)	Leather business						Previous owner relocated
13	Comm. of Mass. (MDPW)	Hoisting equipment business						Previous owner relocated
14	No Name Restaurant, Inc.	Vacant/parking	F	*To be* taken: part of SBHR				Business entitled to relocation benefits
15	Massport	Mixed use	P				603,082	See Table 8.10
16	Fishery Products, Inc	Seafood processing	P		2,195			Measures to preserve buildings, access and business requirements to be determined
17	EDIC	Mixed office industrial	P	67,250	208,295			See Table 8.11

Table 8.9 (Cont.)

LAND USE IMPACTS IN SOUTH BOSTON/SOUTH BOSTON BYPASS ROAD AREA

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf) Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	Impacts/Mitigation
18	Consolidated Rail Corp. *(Conrail)*	Railroad freight operations	P	~~37,500~~ *To be taken: part of SBHR*				No impacts to railroad operations
19	~~N.J. Contos~~ *Conrail*	Railroad freight operations	F	*To be taken: part of SBHR*				~~Portion to be~~ Acquired for SBHR; *no impacts to railroad operations*
21	Bianchi Associates	Clothing manufacture	F	20,620				Business entitled to relocation benefits
22	N.J. and K.N. Contos	Vacant/parking	F	*To be* taken: part of SBHR				~~Future vent building site;~~ Parking business entitled to relocation benefits
23	MBTA	Railroad ROW	P	13,490	11,290			No impact to railroad operations
25	National Railroad Passenger Corp.	Railroad car storage	P	13,490		21,505		No impact to railroad operations
26	National Railroad Passenger Corp.	Railroad ROW	P			14,685		No impact to railroad operations
27	~~MBTA~~ *New Boston Food Market Development Corp.*	Trackage ROW	P			9,785		No impact to railroad operations
28	MBTA	Railroad ROW (Cabot Yard)	P			8,570		No impact to railroad operations
29	New Boston Food Market Development Corp.	Railroad ROW	P	8,730		9,785		Access road to be relocated
30	Owner unknown	Congress St. (private way)	F	19,595				Congress St. to be relocated
31	House of Bianchi Inc.	Parking/dumpster	F	1,486			~~400~~	Business entitled to relocation benefits
32	Conrail	Railroad ROW	~~P~~ *F*	*To be* taken: Part of SBHR			*	No impact to railroad operations
33	Owner unknown	Wormwood St. (private)	P		525			No impact
34	Boston Edison Co.	Vacant	P	14,360			*	Impact uncertain at this time
~~37~~	~~N.J. and K.N. Contos~~	~~Vacant~~	~~F~~				~~*~~	~~No impact to existing business~~
~~38~~	~~Owner unknown~~	~~Passageway (private)~~	~~P~~	~~6,500~~				~~Passageway closed~~
40	Boston Wharf Co.	Business	*P*		340			
41	Owner unknown	B Street	P	5,025	9,745			Roadway to be closed

1. * Uncertain at this time whether area noted will be a taking in fee or an underground/overhead highway easement. Extent of acqusition [partial (P) or full (F)] also uncertain at this time.

Source: Bechtel/Parsons Brinckerhoff

Table 8.12

LAND OWNERSHIP IN EAST BOSTON/LOGAN AIRPORT RIGHT-OF-WAY

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf) Fee Acquisition	Underground Highway Easement	Overhead Highway Easement	Acquisition Type* Presently Uncertain	Impacts/Mitigation
1	Ciampa ~~Realty~~ *Leasing* Corp.	Air freight/*Car rental*	F	124,237				Property to be used for buffer. Business to receive relocation benefits.
2	R. Goldberg, Trustee of A.J. Breman Realty Trust	Park 'N' Fly	F	193,263				Property to be used for buffer. Business to receive relocation benefits.
3	R. Goldberg, Trustee of A.J. Breman Realty Trust	Park 'N' Fly	F	157,000				Property to be used for buffer. Business to receive relocation benefits
4	Consolidated Rail Corp., M.J. Bloom, T.P. Desloge, Jr., R. Goldberg and D. Levin, Co-Trustee (easement holder)	Rail operations, Park 'N' Fly	P	117,500				Loss of some parking and billboards area; ~~business can continue to operate~~. *Property to be used for buffer. Business to receive relocation benefits.*
4a	R. Goldberg, Trustee, Logan Communications Trust (airspace)	Billboard	P	(see Parcel 4)				*Property to be used for buffer. Business to receive relocation benefits.*
5	Massport	Airport operations	P	63,300	544,870	1,619,760		See Table 8.10
6	Massport		P	15,500				See Table 8.10
7	City of Boston	Playground	P					Removal of viaduct on south side will allow for park expansion and better access
8	City of Boston	Playground	P					See #7 above
~~10~~ *9*	Comm. of MA (MDPW)							No change in use
9 *10*	MBTA	Rapid transit ROW	P	22,600				No impact on operations; track will be relocated; improved train/bus transfer
11	RSR Realty Co., Inc.	Mixed	P	32,700				Five businesses to receive relocation benefits
12	Consolidated Rail Corporation	Railroad	P	5,200				

1. * Uncertain at this time whether area noted will be a taking in fee or an underground/overhead highway easement. Extent of acqusition [partial (P) or full (F)] also uncertain at this time.

Source: Bechtel/Parsons Brinckerhoff

Federal resources. A more detailed analysis of the State wetlands resource areas and their associated impacts are provided in the Wetlands and Waterways Appendix, Section 5.

Areas subject to jurisdiction under the State waterways regulations include all flowed waterways and certain filled tidelands. These areas are in addition to the areas of Federal jurisdiction. A detailed analysis of the Chapter 91 jurisdiction and the Proposed Action's conformance with performance standards is found in the Wetlands and Waterways Appendix, Section 6. Consistency with the Massachusetts Coastal Zone Management Policies is presented in Section ~~14.4~~ 14.7 and amplified in the Wetlands and Waterways Appendix, Section 4.

14.1.1 Lower Charles River And Millers River

14.1.1(a) Area Description

Lower Charles River.

The Lower Charles River (see Figure 14.1) lies between the old Charles River dam (constructed in 1910) at the Boston Museum of Science and the new Charles River dam and the Colonel Gridley Locks (constructed in 1976). Following construction of the new dam and locks, tidal fluctuations within the Lower Charles River were effectively eliminated. The locks are used to permit vessels to move between the Charles River and the Inner Harbor.

The Lower Charles River is approximately 2,200 feet long. Its width varies but averages 450 feet. The width on the west side of the new dam is approximately 600 feet, narrowing to about 375 feet beneath the MBTA commuter railroad bridge, and increasing to approximately 450 feet west of the railroad bridge. The greatest width (1,200 feet) occurs immediately east of the old dam. Average water depth is approximately 17 feet, with a maximum depth of 24 feet between the railroad bridge and the new dam.

Fresh water from the Charles River drainage basin flows continuously through the spillways and locks of both the old and new dams before entering the tidally influenced Boston Inner Harbor. The mean annual flow from the river is approximately 450 cubic feet per second (cfs), and the 7-day, 10-year low flow is approximately 22 cfs. The mean annual flood is 1,900 cfs. The effect of the new dam is to maintain constant water depth in the river, within the varying flow.

The new Charles River dam is a part of the flood protection system for the low-lying areas of the Boston region. During high tide and storm conditions, the water elevation of the Harbor can be higher than that of the Charles River Basin. In order to maintain the proper water elevation within the basin -- subject to the possibility of excess inflow from either direction -- a pumping station was built, which includes six 1,400-cfs-capacity pumps. The pump station controls are set to maintain an elevation of 2.35 feet above mean sea level. The reported 100-year flood elevation is 4 feet above mean sea level. Currents and circulation in the basin are regulated by the release rate from the Charles River Dam. Currents are generally unidirectional toward the dam and their velocity varies relative to location. At the narrowest point beneath the railroad trestle, velocity averages 1 foot per second, and can exceed 5 feet per second under flood conditions.

The piers of the Charles River bridge (part of the existing Central Artery) cross the flow path of the river just upstream of the pumping station. Still further upstream, the Boston and Maine Railroad bridge (MBTA commuter railroad trestle) crosses the river, creating a left and right overbank due to the dense pilings underneath. The downstream flow between the overbanks results in a "jet" (concentration) of relatively high velocity flow, curved towards the north shore. This high velocity jet approaches Pier A (the so-called reverse banana pier) of the Charles River bridge, causing a large separation region downstream of the pier. Pier A, however, is hydrodynamically streamlined in order to achieve a uniform flow rate into the pump station .

Sound. The Inner Harbor is the northwest edge of the Outer Harbor and is approximately 3 miles long and 0.5 mile wide (see Figure 14.2). In general, water depths exceed 20 feet, much deeper than most of the Outer Harbor. In this chapter, only Boston Inner Harbor is discussed.

Boston Inner Harbor is subject to two tidal cycles a day with a maximum difference between successive high or low tides of 1.6 feet. The mean tidal range of the Harbor is 9.5 feet, which increases to 11.0 feet during spring tide conditions. Maximum spring tides can produce elevations of 2.3 feet below mean low water (MLW) and 2.6 feet above mean high water (MHW) (Levin and Fitzgerald, 1981). High tide levels can increase substantially as a result of regional storm surges. Depths in the area average 35 feet at MLW.

Measurements of current speed and direction were conducted at four locations on spring (high) and neap (low) tidal cycles during March 1982 for the FEIS/R. Data from two current meter stations which are very close to the proposed tunnel alignment indicate peak velocities of 1.0 fps during spring tides. The predominant velocities ranged from 0.10 to 0.26 fps.

During ebb tide, higher current velocities were found to occur in the middle and bottom of the water column. This may be related, in part, to the freshwater input from the Charles and Mystic Rivers. The less dense fresh water, stratified over the more dense seawater, flows counter to flood tides and enhances slightly the ebb velocities at the surface. (Details on the tidal prism can be found in Chapter 13.) The small fetch within the Inner Harbor limits the size of wind-generated waves; hence, tidal currents dominate. Because of successive filling during Boston's development, the hydrographic characteristics of the Harbor have changed significantly and now the currents within the Inner Harbor are oriented primarily along the ship channel.

The Harbor is used by a variety of commercial vessels including container ships, general cargo ships, fishing boats, car carriers, deep draft oil and other bulk carriers, and other shipping and vessels needing repair and conversion. In addition to commercial vessels, the Harbor and waters seaward are used for a significant amount of recreational boating. ~~Industrial surface water uses within Boston Inner Harbor are found in Table 14.3.~~ No public or private uses of water for human consumption occur and no known groundwater uses are present.

Major docks and berths in the vicinity of the proposed action include the Subaru Pier, General Ship, Massport Fireboat Dock, and the airport shuttle terminal. (Marinas, wharves, and piers in the Inner Harbor are listed in Table 14.2.)

14.1.3(b) Aquatic Resources

The Federal aquatic resources of Boston Inner Harbor affected by the Proposed Action consist of tidal waters. The coastal banks of Boston Inner Harbor are largely manmade. The banks consist primarily of rock bulkheads and revetments, although areas of riprap, rubble, piers, and pilings also are present.

Tidal Waters. The substrate in the affected sections of the Boston Inner Harbor consists of mud, silt, and clay. Sediment sampling conducted in January 1987 indicated a varying level of contaminants by such metals as arsenic, chromium, copper, mercury, lead, and zinc. The shipping channel contained higher levels of metals, oil, and grease. The bioassay tests indicated that the sediments sampled were nontoxic. The USACE has reviewed the bioassay data for the sediments sampled between South Boston and Bird Island Flats, and has notified the Department in correspondence dated September 22, 1988, that those sediments met the criteria in 40 CFR 220-227 for disposal of dredged material in ocean waters.

Marine life in the Inner Harbor consists of polychaete worms, small crustaceans, bivalves, and snails. About 90 benthic macroinvertebrates have been identified; pollution-tolerant worms such

The placement of bridge piers will also result in the loss of flood storage capacity 1,231 cf in the Millers River and 2,800 cf in the Charles River. The amount of flood storage capacity lost has been minimized through the design process by limiting the number of piers in the flood plain area. As mitigation, the existing I-93 bridge piers will be removed, resulting in a gain of 1,540 cf, for a net loss in the combined Millers and Charles Rivers of 2,500 cf. To mitigate this loss, an area along the west bank of the Millers River will be pulled back to provide a minimum of 2,500 cf of compensatory flood storage capacity, resulting in no net loss of flood storage from the project.

The placement of ~~bridge piers~~ a retaining wall to support a ramp structure along the banks of the Millers River will result in the permanent loss of ~~125~~ 300 sf of vegetated wetlands. The impact on this resource area has been minimized through the placement of bridge piers outside the vegetated wetlands wherever possible. Wetlands vegetation to offset the ~~125~~300-sf loss will be replicated along the west bank of the Millers River. Areas disturbed during construction will be revegetated after construction.

Changes in plant species mix and density may occur in certain portions of the vegetated wetlands along the Millers River as a result of shading from overhead structures. A landscape program will be implemented which provides supplemental shade tolerant vegetation following the completion of the construction.

New storm drains outlets into the Millers and Charles Rivers will be designed to minimize oil, grease and sediment discharges and to maintain water quality.

14.3.1(b) Navigation Mitigation

A number of alternative bridge pier designs have been reviewed to minimize the adverse impact of the bridge crossing on the waters of the Charles River. The Proposed Action represents a significant improvement over the DSEIS/R design. The long-term impact of the Proposed Action to navigation is minimal. The specific mitigating measures which are proposed include:

- Use of long-span bridges over the Charles River, reducing the number of bridge piers from 17 to 11.

- Placement of all bridge piers outside of the line of navigation, in line with existing fenders wherever possible.

- Install a~~a~~ fendering system ~~will be installed~~. The specific design parameters will be reviewed with the MDC, Coast Guard and maritime interests.

- Provide ~~C~~closed circuit television monitors ~~will be provided~~ to MDC Charles River dam operators, should the design result in an obstruction of the upriver views.

- ~~The Department has a m~~Major commitment by the Department to water transportation in the Inner Harbor as part of the Artery/Tunnel Project. To improve the opportunities for water transportation, the Department will construct a water transportation terminal at Lovejoy Wharf, accessible to the North Station intermodal transportation facility.

14.3.2 Fort Point Channel Mitigation

14.3.2(a) Aquatic Mitigation

The redesign of the Fort Point Channel crossing has resulted in reduction in fill of 1 acre and a minimal impact on coastal mudflat due to the use of pile supported structures rather than fill.

The Proposed Action will result in the displacement of water within the Fort Point Channel due to unavoidable fill from the tunnel approach and crossing. This fill is not expected to have a significant impact on storm drainage prevention or flood control.

To offset the 100-sf of permanent loss of coastal mudflat, which ~~may~~ contains some shellfish, a compensatory mudflat will be created along the bank of the Upper Fort Point Channel. The area will be a minimum of 100-sf and it is expected that it will recolonize with shellfish within one growing season.

The Proposed Action will also result in the narrowing of the Upper Fort Point Channel, increasing water velocities during large storm events. The Channel will be dredged to provide additional hydraulic capacity and the shoreline will be appropriately protected from erosion.

Sedimentation upriver of the tunnel box may occur, but this is not viewed as an adverse impact and no mitigation is proposed.

14.3.2(b) Navigation Mitigation
Approximately 800 derelict piles will be removed down to the mudline to remove obstructions to navigation and reduce the hazards from floating debris.

As part of its commitment to water transportation the Department will provide for the construction of a dock on Fort Point Channel to accommodate water taxis in an Inner Harbor shuttle loop. This site would provide connections between the Navy Yard and South Station and the Financial District. This docking facility is consistent with the recommendations of the Boston Inner Harbor Water Transportation Study prepared by TAMS Consultants, Inc., and Charles Norris in 1989. It will also create a South Station-North Station link since there is also a docking facility programmed for North Station as discussed in Section 14.3.1(b).

14.3.3 Boston Inner Harbor Mitigation

14.3.3(a) Aquatic Wetlands Mitigation
The permanent impacts on Boston Inner Harbor are minor. A small corner of the slip at General Ship will be filled. This is an unavoidable loss of tidal waters, due to the tunnel alignment.

14.3.3(b) Navigation Mitigation
The project will have no long-term adverse impacts on navigation. During construction, a Navigation Maintenance plan will be implemented. The project will coordinate the construction activities with the U.S. Coast Guard, Boston Harbormaster and maritime interests. The fill proposed at General Ship will not result in any adverse impacts to navigation of aquatic resources.

14.4 COMPARISON WITH FEIS/R

Since the publication of the FEIS/R, there have been substantial reductions in the proposed amount of encroachment on wetlands, waterways, and coastal zones. Table 14.8 summarizes the changes in impacts since the FSEIS/R. The northbound Central Artery has been removed from Fort Point Channel, and the I-93/I-90 Interchange, Ramp K and Frontage Road northbound have been moved westerly with most of the interchange onshore. Consequently, the total filling of Upper Fort Point Channel for the I-93/I-90 Interchange has been reduced by 84 percent, from 13 acres to 2.1 acres, or from 440,440 cubic yards to 70,100 cubic yards. The tunnel box structure in Fort Point Channel will encroach upon 4.6 acres of tidal waters, with a volume of 67,000 cubic yards.

In addition, the removal of the Leverett Circle connector from the Charles River, as proposed in the FEIS/R, will result in a 100 percent reduction in volume of encroachment and 97 percent reduction in area at that location. The 1985 proposal required 12,000 cubic yards of water displacement, while the Proposed Action results in an encroachment of 988 cubic yards of water volume in the Charles River and an encroachment of 166 cubic yards of water in Millers River.

Neither the fill in the slip east of the General Ship dry dock in Boston Inner Harbor nor the bridge piers in Millers River were a part of the FEIS/R. The fill at General Ship will be minor and will have no long-term impact on the environment. Landscaping as appropriate will be undertaken at the Millers River as well as provision of compensation for flood storage.

Overall, the Proposed Action will result in an 88 percent reduction in encroached area and an 89 percent reduction in volume displaced compared to the FEIS/R scheme.

14.5 RESOLUTION OF MAJOR ISSUES SINCE DRAFT SEIS/R

The major issues raised in the public review of the Draft SEIS/R indicated the need for additional data and analyses, namely:

- Section 404(b)(1) analysis - USACE
- cumulative impacts
- alternative analysis, especially for the Area North of Causeway Street
- hydraulic studies
- tidelands impacts and mitigation
- impact of project on CANA improvement
- State wetlands impacts
- mitigation for aquatic resources
- number and location of piers in Charles River

These issues were resolved in the following manner:

- The Section 404(b)(1) analysis was prepared [see Section 404(b)(1) Appendix].
- The overall impacts of the Artery/Tunnel Project and other concurrent major projects are discussed in Chapter 18.
- A chapter was added that describes the alternative schemes studied in the Area North of Causeway Street in Part IIB of the FSEIS/R.
- A hydraulic study for Fort Point Channel was conducted and is documented in Chapter 13.
- Extensive treatment of tidelands-related issues has been incorporated into this section and the Wetlands and Waterways Appendix, Section 6.
- Description of CANA improvements and mitigation is described in this chapter~~.~~ and in the Wetlands and Waterways Appendix, Section 6.
- The State-regulated wetlands analysis is found in the Wetlands and Waterways Appendix, Section 5.
- The number of piers in the Charles River has been reduced from 17 to 11. The location of the piers has been substantially improved for navigation purposes

14.6 ONLY PRACTICABLE ALTERNATIVE FINDING AND EXECUTIVE ORDER 11990

There are no practicable alternatives to the Proposed Action. Impacts have been substantially reduced from the FEIS/R. Wetlands impacts have been minimized.

Table 14.2

MAJOR EXISTING PIERS AND BERTHS IN THE VICINITY OF PROJECT ACTIVITIES

Location/Name	Function
Charles River	
U.S. Coast Guard Piers 1, 2 and 3, marginal wharf	Coast Guard vessel dockage
Constitution Marina	Recreational marina
U.S.S. Constitution excursion boat dock	Drop-off and pickup by Harbor excursion boats
Pier 4, Charlestown, public pier	Short-term dockage, Boston fireboat pier Charlestown-Long Wharf commuter boat
MDC Wharf near Steretti Rink	Short-term dockage, fishing pier
Lovejoy Wharf	Proposed ferry terminal
MDC Police Harbor Patrol dock	Patrol boat dockage
Gridley Locks	
Cambridge Galleria bulkhead	Short-term dockage for recreation boats
Science Museum Dock	Charles River excursion boat dock
Charlesgate Yacht Club	
Tugboats Venus and Luna	
Fort Point Channel	
Fan Pier No. 1, excursion boat pier	Excursion boats to Stellwagen Bank, Gloucester and Inner Harbor
Neptune Lobster and Seafood Co. Wharf	Lobster boat dock
McKie Lighter Wharf	Lighter and barge dockage
Children's Museum wharf	Lobster boat, restaurant barge dockage
Tea Party Ship	Museum ship
Fort Point Marina	Recreational marina
Harbor Rowing Club	Rowing club
M/V Chelsea ferry	Office space
~~400 Atlantic Avenue Wharf~~	~~Commuter boat mid-day dockage~~
Inner Harbor, Central Area	
Rowes Wharf	Excursion and Commuter boat dockage
India Wharf Marina	Sailing center and marina
Aquarium	Whale watch boat dockage
Long Wharf	Excursion and commuter boat dockage, marina
400 Atlantic Avenue Wharf	*Commuter boat mid-day dockage*
Inner Harbor-South Boston Shore	
Pauls Lobster Company	Wholesale lobster
Commonwealth Pier	Excursion boat dockage
Fish Pier Pier 7	Ship repair, marina, fuel dock
General Ship	Graving dock, ship repair
Subaru Terminal	Auto import
Coastal Cement	Cement import
Dry Dock #3	Not presently in use
Boston Police Pier	Harbor police
Inner Harbor-East Boston Shore	
Massport Water Shuttle and Fireboat Pier	Dockage
Massport Old Fireboat Pier	Not in use
Jeffries Yacht Club	Recreational boating
Boston Marine Works	Ship repair, marina, fuel dock, marine contracting

Source: The Port of Boston, Massachusetts, Port Series No. 3, U.S. Army Corps of Engineers

Table 14.6

FUNCTIONAL EVALUATION SUMMARY

Function	Millers River		Charles River		Fort Point Channel		Boston Inner Harbor	
	Nontidal Water	Inland Wetland	Nontidal Water	Inland Wetland	Tidal Water	Coastal Mudflat	Coastal Wetland	Tidal Water
Groundwater								
Recharge	L	L	L	L	N	N	N	N
Discharge	L	L	L	L	L	L	L	L
Supply	L	L	L	L	N	N	N	N
Storm Damage Prevention								
Flood Storage and Desynchronization	M	L	H	L	L	L	L	L
Sediment and Shoreline Stabilization	L	L	H	H	H	L	L	H
Water Quality								
Sediment/Toxicant Retention	H	L	M	L	H	H	L	M
Nutrient Retention/ Transformation	H	L	M	L	H	H	L	M
Surface Water Supply	L	L	L	L	H	L	L	H
Biological Resources								
Nutrient Export	L	L	L	L	L	L	L	L
Aquatic Diversity/Abundance	L	L	L	L	L	L	L	M
Fish Habitat	L	N	H	N	M	L	L	H
Shellfish Habitat	N	N	N	N	L	L	L	L
Wildlife Habitat	L	L	M	L	M	L	L	M
Endangered Species	L	L	L	L	L	L	L	L
Human Resources								
Recreation	L	L	H	L	H	L	L	H
Uniqueness/Heritage	L	L	H	L	M	L	L	M

1. Criteria for the following values are presented in Table 14.7: N = Nonfunctional; L = Low Value; M = Moderate Value; H = High Value

Source: Jason M. Cortell, ~~1986~~ *1989*, Aquatic Resources Functions and Values Volume 1 Roadway, Tunnel and Bridge Alternative Assessment, Waltham, MA

Table 14.9

PROPONENT'S FACTUAL DETERMINATION: MILLERS RIVER (NONTIDAL)

Parameter	Short-Term Impact	Long-Term Impact
Substrate	Agitation and disturbance caused by equipment access to drive piles and construct foundations.	Change of 0.03 acre from fine silts and clay to concrete pier. Area outside of pier will remain in its current state.
Water Circulation	No change in circulation patterns or flow rates. Potential decreases in DO and increases in metals resulting from sediment disturbance.	No change from present
Suspended Particulates	Fines will be suspended, thus increasing turbidity. Silt fences will prevent degradation in Charles River.	In accordance with permit conditions
Contaminants	Potential increases from disturbance of existing sediments.	In accordance with permit conditions
Ecosystem	No fish and limited benthic populations are present. A total of 0.44 acre of vegetated wetland above water line ~~will be lost during construction~~ *may be lost as an indirect result of shading.*	The amount of direct sunlight will be reduced by bridge deck. The erosion control, meshing and cover functions of the shoreline vegetation will be provided by reestablishing suitable stands of vegetation that can adapt to the new light conditions.
Mixing Zone	Confined to concrete form	None
Cumulative		No adverse cumulative impact
Secondary Impact	Potential for adverse effect on Charles River. Existing causeway and culverts facilitates control of releases from Millers River.	None expected

Source: Bechtel/Parsons Brinckerhoff

Table 14.13 (Cont.)

COMPARISON OF PROPOSED ACTION TO COASTAL ZONE MANAGEMENT REGULATORY (R) AND NONREGULATORY (NR) POLICIES [301 CMR 20.05 (3)]

Policy		Consistency of Proposed Action
NR6	Promote the widest possible public benefit from channel dredging . . . . Ensure that this dredging is consistent with marine environment policies.	~~There is no channel dredging proposed as part of this project. Dredging in connection with the tunnel will comply with all relevant environmental regulations and policies.~~ *Limited channel dredging is proposed in Fort Point Channel to deepen the channel in the vicinity of Dorchester Avenue to accommodate increased velocities during construction.*
NR7	Encourage through technical and financial assistance expansion of water-dependent uses in designated ports and developed harbors, redevelopment of urban waterfronts and expansion of visual access.	Lands access to designated port areas in South Boston, East Boston and Charlestown will be enhanced, which is likely to result in the expansion of water-dependent uses there. Improved pedestrian and visual access along the waterfront and between the waterfront and other areas of the City are likely to enhance the potential for redevelopment of those areas to the extent consistent with other State and local plans and policies.
NR8	Improve access to coastal recreation facilities, and alleviate automobile traffic and parking problems through improvements in public transportation. Link existing coastal recreation sites to each other or to nearby coastal inland facilities via trails for bicyclists, hikers and equestrians, and via rivers for boaters.	Access to Boston and travel through the City to coastal sites north and south of the City will improve. EOTC-adopted transportation policy ensures that public transportation improvements will occur along with the Proposed Action as part of a comprehensive multimodal scheme for improving public access to, and reducing traffic and parking congestion in Boston. Pedestrian access to the waterfront areas of downtown Boston will be enhanced, although temporary inconveniences in pedestrian access may result during construction. The Proposed Action incorporates the MDC plan for a link between the Lower Charles River and the Charles River Reservation including an extension of the pedestrian and bicycle path along the river. The Department will work closely with the City and the State to provide public access to Fort Point Channel wherever possible, including access to 2.1 acres of landscaped fill in South Bay. There will be no long-term impacts on recreational navigation from the project.
NR9	Increase capacity of existing recreation areas by facilitating multiple use and by improving management, maintenance and public support facilities. Resolve conflicting uses whenever possible through improved management rather than through exclusion of uses.	The impacts of the proposed project on recreational areas are discussed in connection with policies R13 and NR8.
NR10	Provide technical assistance to developers of private recreational facilities and sites that increase public access to the shoreline.	Public access to the shoreline will be improved or maintained in all areas of the project.

In addition to the opening of the Third Harbor Tunnel, key project scheduling constraints include the Fort Point Channel crossing and the transition roadway segment between the Dewey Square tunnel at Kneeland Street north to the elevated Central Artery. Construction stages for each project subarea are summarized below. A more detailed discussion for each area is provided in the appendix.

20.1.2(a) Area North Of Causeway Street

Construction in the Area North of Causeway Street will require careful attention to the continuing operation of major transportation facilities including the Charles River high bridge, North Station commuter railroad trestle bridge, the MBTA Orange Line, and major roadway interchange connections on both sides of the Charles River linking downtown Boston and Leverett Circle with the regional highway network north of Boston. Construction will be phased over approximately 8 years, involving five stages.

20.1.2(b) Central Area

The sequencing of Central Area construction is proposed in five overlapping stages during an 8-year period. Traffic will be maintained during the entire construction period by keeping all six lanes of the existing elevated Central Artery open until corresponding segments of the new underground roadway are ready for operation. In addition to the utilization of special design and construction methods, this will be accomplished by sequencing the work to minimize traffic disruption. Connections to other roadways will receive special attention.

A key scheduling constraint which will affect maintenance of traffic in this area is the new northbound tunnel segment along Atlantic Avenue in the Dewey Square area. This component must be completed, and northbound Central Artery traffic diverted to it, in order to connect and complete the southbound segment of the new roadway through the existing Dewey Square tunnel, while still maintaining traffic flow. The work has been sequenced to complete and open the northbound tunnel first, in order to accommodate this scheduling constraint.

Construction sequencing is planned so that Central Artery ramps can be maintained or replaced with temporary ramps to the maximum extent possible. However, most of the ramps between Congress Street and the Charles River will be replaced during construction. Because of space constraints at certain locations, a few ramps will be taken out of service without a replacement. This is planned at ~~five~~ four locations, requiring temporary surface street detours to other ramps. These locations are: the northbound on-ramp from Atlantic Avenue at Northern Avenue; the northbound off-ramp near Northern Avenue; the southbound on-ramp from Causeway Street~~; the northbound off-ramp to Causeway Street~~; and the southbound on-ramp from Purchase Street, adjacent to International Place.

All major surface streets, pedestrian walkways, and routes crossing underneath the Central Artery will be maintained throughout the construction period. This will be accomplished by phasing the work across each location, providing temporary detours and traffic shifts, as required, to maintain traffic flow.

20.1.2(c) I-93/I-90 Interchange And Massachusetts Avenue Interchange Area

Construction in this area is proposed to extend in five stages over a 9-year period. The strategy is to complete construction of railroad and roadway facilities located on the periphery of the existing I-93/I-90 Interchange during the early construction stages without disturbing major traffic movements. Mainline and interchange ramp work, including the I-90 extension and Fort Point Channel crossing, will proceed during Stages 2 through 4 toward completion and connection with the Seaport Access Highway/Third Harbor Tunnel in Stage 5.

I-93 mainline construction will occur during the same period. The construction north of Randolph Street will concentrate on I-93 northbound and adjacent ramps in the early phases of the work,

The project subarea which will experience the most extensive impacts to parking is South Boston. Average yearly impact in this area will be 1,725 spaces. The other subareas will experience substantial impacts but for shorter periods. In the Area North of Causeway Street/Central Area an average of 1,281 spaces will be affected each year of construction. During years 4 through 8 impacts will be more substantial. An average of 1,462 spaces will be lost during each of these years. The impact to parking in the South Bay area will be particularly high years 3 through 7, 610 spaces per year on average. The largest impact in East Boston will occur during years 4 through 8 when a yearly average of 897 spaces will be affected.

Trucks. As discussed in Section 20.1.1(f), Logistics, the construction materials required to build the project and excavated, demolition, and other material will be moved into and out of the construction areas primarily by trucks. (Table 20.1 lists the expected number of truck trips to and from each of the six construction areas, based on the amount of materials to be handled over the lifetime of the project.) The table indicates that the peak year for truck traffic is expected to be 1995, when approximately 1,760 truck trips per day projectwide are expected. This figure will vary based on average and peak conditions for each contract and work site. Many of these trips will be relatively short, either to the barge loading facility at Dry Dock #3 in South Boston for the southern portion of the project, or to nearby laydown or soil processing areas to the north and southwest. The South Boston Haul Road and provision for trucks within the project right-of-way will reduce the volume of project-related trucks on streets and roadways. Whenever possible, the same trucks that haul material into the project will be used to haul material out of the project thereby reducing the number of truck trips required. These truck volumes have been incorporated into the 1994 traffic forecasting model.

While truck routes for materials hauled into the project have been generally defined based on assumptions regarding the source of material and discretionary options available to contractors, more specific information is available on materials disposal, based on the extensive assessment of disposal scenarios conducted by the project. Truck routes have been identified for excavated material hauled to Dry Dock #3 and the processing area between the east and west service roads connecting Congress Street and Northern Avenue in South Boston, from both the Central Area and the South Bay Interchange Area.

- Trucks carrying excavated material from the Central Artery, Atlantic Avenue (Kneeland to Congress Streets), and Dewey Square Tunnel areas (contracts C11A, C17A, and C18A) will use Northern Avenue for travel to and from the South Boston processing area and Dry Dock #3.

- Until the end of 1994, the route for trucks carrying excavated material from these areas for all other contracts will be east on West Fourth Street, south on Dorchester Avenue, and north on the Haul Road. Trucks destined for Dry Dock #3 will continue on the Haul Road to Northern Avenue. Trucks to the processing area will exit at Congress Street and take B Street. ~~Trucks from the Central Area north of North Street will use the Central Artery to Berkeley Street off ramp to access West Fourth Street. Trucks making the return trip will traverse the same route, using the Berkeley Street on-ramp for Central Artery northbound.~~Trucks from north of North Street will use the construction project decking and surface arteries, not the I-93 viaduct.

- Starting in 1995, trucks will no longer use West Fourth Street to access the Haul Road. Instead, they will be routed to Southampton Street via a temporary off-ramp from southbound I-93. From eastbound on Southampton Street, trucks will travel northbound on the Frontage Road and turn right to enter the South Boston Bypass Road/Haul Road. (The construction of the Bypass Road will be completed by the end of 1994.) On the return trip, trucks will turn right from the South Boston Bypass Road to the northbound Frontage Road and take the Berkeley Street on-ramp for northbound I-93.

extent that these sites are accessible to rail freight lines, they will help mitigate systemwide traffic impacts. Further discussion is included in Chapter 4 of Part II of this FSEIS/R.

Also, some suburban communities have raised a concern that increased parking at commuter rail and subway stations attributable to the project could cause local traffic circulation problems. These fears, whether real or imagined, must be weighed against the overall systemwide benefits of increased public transportation for the project, the region, and the local areas themselves.

20.2.1(b) Local Area Effects On Traffic

Each local area will encounter different traffic and transportation conditions during construction, including temporary detours and diversions, parking, delivery and removal of construction materials, and provisions for contractors and employees. Fifty-nine detours and diversions have been identified and described which could affect traffic in local areas during various stages of construction. Based on the work conducted to date, an estimated 33 traffic conditions may require some form of mitigation. Each of these conditions is discussed and illustrated with figures for the six project subareas in the Maintenance of Traffic Plan Appendix. A summary of the traffic conditions ~~is provided here~~ follows. The information contained in this section is subject to change as final design proceeds on the project.

Area North Of Causeway Street. The five primary detours and maintenance of traffic conditions in this area involve traffic on I-93 and I-93 connector ramps to Storrow Drive, Leverett Circle, and Route 1 in Charlestown. There are few surface streets north of Causeway Street that could be affected by construction. Minor traffic disruptions during off-peak periods may occur during interim relocations of Nashua Street during viaduct modification work and North Station garage construction, and on New Rutherford Avenue during construction of new surface ramp connections to Route 1. The present number of travel lanes will be maintained on local streets. Traffic flow on all surface streets in the area will be continuously maintained throughout the construction period.

Movement Of Construction Materials: Excavation in this area will be limited to pier footings, marine excavation for the river crossing bridge piers, excavation work for the bridge approach segments north of Causeway Street, and excavation for the new underpass below Leverett Circle. Total excavation is expected to generate approximately 135,000 cubic yards, largely from the bridge approach section and new underpass. This relatively small volume of material will be disposed of by trucking it to South Boston via the North Washington Street bridge, ~~the I-93 viaduct~~the construction project decking and surface arteries, Albany Street, West Fourth Street, Dorchester Avenue, and South Boston Haul Road. Once in South Boston, the material will either be delivered to the processing area or Dry Dock #3 for shipment to Spectacle Island..

Material excavated for the river crossing support will be loaded directly into barges, and transported through the MDC dam locks to Spectacle Island and the Massachusetts Bay Disposal Area.

Construction in this subarea will also require the demolition of and removal of debris from the Anelex building at 150 Causeway Street. This 13-story reinforced concrete structure will generate approximately 1,000 truckloads of debris. This material will be trucked to a reclaiming area in Saugus or a similar location.

Approximately 100,000 cubic yards of concrete will be required for bridge footings, piers, deck surfaces, approach slabs, and bridge abutments in the Area North of Causeway Street. Concrete demand will be spread out over a 4-year construction period, and peak truck volumes generally will not exceed 20 to 26 truck trips per day in each direction (three to four two-way trips per hour). The area is accessible by several existing ready-mix concrete suppliers. The primary route for

activities. Measures to mitigate the most severe temporary disruptions are discussed, and will be developed further as a part of the Maintenance of Traffic Plan.

Movement Of Construction Materials: Approximately 3.0 million cubic yards of excavated material will be removed from the Central Area. Assuming all excavated material is removed by trucks, hauling would be conducted during the daytime shift from 7:00 AM to 3:30 PM; however, a second and third shift will be utilized when necessary to maintain schedule. Second shift hours are generally from 4:00 PM to 12:00 midnight and third from 12:00 midnight to 7:00 AM. Other work performed on the second and third shifts could include installation of the excavation support system, artery underpinning, utility work, form work and reinforcing steel installation, and completion of concrete placements. To the extent possible work will be conducted below decking or will be done to mitigate the impact of particular phases of construction, such as a street closure or work in front of a building access point. When second and third shift operations are necessary, they will be conducted in compliance with applicable City ordinances governing noise and vibration restrictions.

Excavated material removed from the Central Area construction will be hauled to the south via construction project~~by way of I-93 using the southbound on ramp at Cross Street~~ decking and surface arteries. All soil will be hauled to the South Boston processing area or to Dry Dock #3 for transport to Spectacle Island. Trucks will travel through the present parking lot area directly under the existing viaduct structure to access the southbound on-ramp at Cross Street. During the early phases of the slurry wall construction, Artery underpinning, and deck beam installation work, the trucks will travel across the existing cross streets at New Sudbury, North Washington, and Causeway Streets. Maximum volumes during this phase will generally not exceed 40 to 50 truckloads per day (five to six two-way trips per hour). Crossings will be controlled by flagmen and traffic signals. Peak truck volumes north of North Street will occur in late 1994 and throughout 1995, during the tunnel excavation work, when an average of 130 truckloads per day are anticipated.

During mainline construction, excavated material removed from the area between North and Kneeland Streets will be trucked to the Dry Dock #3 barge loading facility via Northern Avenue bridge or Congress Street bridge. These trucks will travel on a designated haul route described earlier in Section 20.2.1(a).

Excavation for the new tunnels between Dewey Square and (approximately) High Street will occur later, after the new northbound tunnel is completed. Excavated material from this area will be hauled to processing areas in 1996 through 1998. The peak rate could reach 200 truckloads per day (24 two-way truck trips per hour). Trucks will be required to use Purchase Street, Congress Street, Atlantic Avenue, and Milk Street.

Some debris and construction products, such as slurry removed from slurry wall trenches, will require specialized handling and disposal measures. Excessively wet material, such as excavation from the slurry trenches, can be mixed with dry material prior to trucking, or the material can be hauled in sealed trucks that will contain leakage. Used slurry will be hauled in tank trucks to remote drying yards prior to disposal; however, such materials are expected to generate only periodic truck trips, with vehicle routings determined during final design. Some temporary drainage of water may occur, as described under Section 20.2.6(e), Projectwide Impact Issues.

Approximately 1.3 million cubic yards of concrete will be required to construct the Central Area portion of the project. The Central Area is accessible to several major suppliers, and the construction of additional concrete supply facilities will not be required. The primary routes for concrete deliveries will be from the north, using either I-93 or North Washington Street via the Charlestown bridge, or from the west using the Massachusetts Turnpike.

Construction Work Areas: Most of the land in the Logan Airport/East Boston area is occupied, and construction space will be at a premium. Remnants of parcels taken for construction and I-90 right-of-way not actually under construction will be used for field offices, construction equipment, materials storage, and on-site fabrication. Many of the facilities to be demolished for I-90 construction will be relocated by Massport in coordination with the Federal Aviation Administration to other areas of the airport. Construction personnel will be expected to use public transportation, such as the MBTA Blue Line or contractor-furnished transportation from remote laydown areas and park-and-ride lots.

20.2.1(c) Construction Year Traffic Forecasting

A construction year traffic forecast was developed for the FSEIS/R using the same technical approach as was applied to the 1987 base case and 2010 design year forecasts. This approach was based on the use of a computer model called Tranplan which is capable of simulating traffic conditions under defined roadway configurations and traffic volumes based on estimates of future land use and trip generation. For the purposes of the FSEIS/R, average 8-hour traffic forecasts, which form the basis of air quality modeling, and PM peak hour forecasts were produced.

A 1994 scenario was selected because surface traffic disruption will be greatest in that year, yet no major additional service capacity (such as the Third Harbor Tunnel or northbound depressed Central Artery) will yet be available. The traffic modeling for this scenario focused on the densely developed downtown area, which currently experiences major traffic congestion and air quality violations, and where the greatest potential traffic and air quality problems might be expected. It is the project's intention to model other scenarios following completion of the FSEIS/R. The assumptions and procedures used in this forecast were developed in close cooperation with the U.S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection during meetings held in July through October 1990. The assumptions and procedures are described in a technical support document.

During the construction of the project, construction scenarios will change frequently as surface streets are opened in specific locations and then decked over to restore normal traffic flow. Many of these details are still to be determined by the Section Design Contractors (SDCs) and ultimately the construction contractors. It would be impossible to model each such change. Therefore, this modeling exercise focused on major construction impacts, i.e., the removal of a ramp to/from the elevated Central Artery or the reduction in surface arterial capacity scheduled to last, in most cases, for a minimum of 1 year. This 1-year threshold is the basis for air quality modeling as well. Both build and no-build 1994 forecasts were produced. Regional traffic growth and trucks generated by the construction of the Artery/Tunnel Project were taken into account. This includes trucks carrying material to barge sites and disposal sites and bringing backfill and other material into the project area.

Potential Traffic Problems. A number of local traffic detours have been identified in Section 20.2.1(b) and are described in the Maintenance of Traffic Plan Appendix which will occur in the Central ~~a~~Area in 1994. These include:

- Northern Avenue on-ramp to I-93 northbound removed
- I-93 northbound off-ramp to Northern Avenue removed
- ~~Atlantic Avenue reduced to three lanes between Kneeland and Summer Streets; two lanes between Summer Street and Northern Avenue; and one local lane only between Northern Avenue and Commercial Street~~Atlantic Avenue reduced to two lanes from Kneeland Street to Northern Avenue.
- Storrow Drive reduced by one lane just west of Leverett Circle (maximum 6 months)

in Chapter 4, peak 1-hour concentrations of CO were obtained by dividing peak 8-hour values by 0.6, to account for the observed fact that vehicle volumes, vehicle speeds and meteorological conditions during the 8-hour period will vary from those that persist for only 1 hour.

CO background levels used in this analysis are presented in Tables 20.10 and 20.11. These values were developed in consultation with EPA and DEP on the basis on 1987 background CO levels for the 8-hour and 1-hour averaging periods, and adjusted to reflect projected changes in future (1994) CO emissions using the same procedures as those applied in Chapter 4.

Results. The results of the CO microscale analysis are summarized in Tables 20.10 and 20.11. Provided are estimates of 1-hour and 8-hour concentrations of CO for midblock and intersection locations in the vicinity of each nominal analysis site, with and without the expected construction-phase roadway geometry and associated construction-related activity. The results of the analysis indicate that:

- One-hour CO concentrations in 1994 with or without the construction activity will be less than (in compliance with) the National and Massachusetts AAQS of 35 ppm at all locations analyzed. The maximum 1-hour CO concentration in 1994 with the construction activity (18.5 ppm) was estimated near the intersection of Essex and Lincoln Streets.

- Eight-hour CO concentrations in 1994 will exceed (not in compliance with) the AAQS at one location without the project and three locations with the project. The maximum 8-hour CO concentration in 1998 with construction (11.1 ppm) was estimated near the intersection of Essex and Lincoln Street.

- CO concentrations with the construction activity were greater than those without the construction activity at all but ~~three~~ two of the nineteen locations analyzed.

- CO concentrations in 1994 will be less than CO concentrations in 1987 at all locations analyzed with or without the construction activity. This is to a great extent a result of the lower emission rates predicted in EPA's MOBILE 4 emission factor model for future years. These lower emission rates are attributed to the wider use of cleaner vehicles, including an increase in the number of vehicles using multiport fuel injection systems in future years.

20.2.4(b) Fugitive Emissions

Fugitive Dust Sources. Fugitive dust is airborne particulate matter, generally of a relatively large particulate size. Construction-related fugitive dust emissions is generated by truck traffic on unpaved roads in construction areas; earthworking activities including excavation, grading, and demolition; and concrete batch plant operation. Each of these sources is described below.

Truck Traffic And Earthworking Activities: Fugitive dust will be generated by haul trucks, concrete trucks, delivery trucks, and other vehicles moving around the construction sites. This will be due primarily to particulate matter that will be resuspended by vehicle movement over paved and unpaved roads and other surfaces, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks.

Earthworking activities that could generate fugitive dust include: excavation of the first 10 feet of the surface layer and cutting of tunnel trenches; scraping and grading of roadbeds; load-in/load-out of haul trucks with excavated material, demolition wastes, and backfill; and storage of excavated materials at barge loading facilities. (Table 20.1 in Section 20.2.1(a) lists the expected number of truck trips to and from each of the six construction areas, based on the amount of materials to be handled over the lifetime of the project.)

Impact Methodology. An analysis was completed of the impact of fugitive dust on ambient levels of PM_{10} (particulate matter with an aerodynamic diameter less than 10 microns). The analysis was completed for 1994, the year of maximum construction-related activity. Estimates were completed of the total fugitive PM_{10} emissions anticipated in 1994 by relevant construction activity, based on EPA developed emission factors for construction operations (EPA Control of Open Fugitive Dust Sources. EPA-450/3-88-008). (See Table 20.12)

A review of construction activities indicates that the greatest potential for dust generation is associated with the excavation and transportation of excavated material to the various disposal sites. It is estimated that 25,000 tons of material will be transported per day during 1994, assuming peak daily activity for 240 days for that year.

The greatest potential contributor to dust emissions is haul truck travel on unpaved surfaces. The emissions factors used in developing estimates of total emissions from this source are based on a 50% control efficiency associated with watering of unpaved surfaces. No credit was taken for initial high water content of excavated material. The contribution from the second greatest source, wind erosion from exposed construction areas, should also be less than the estimates given in Table 20.12, since much of the exposed area will be depressed and not directly subject to the effects of wind.

Emissions estimates for the proposed daily cover material ~~purchasing~~ processing center will be refined after the design is finalized. Major uncertainties concern the use of trucks, barges or rail options to transport cover material. The estimates in Table 20.12 are based on emission factors for typical construction activities.

Most excavation and construction activities will be performed under scaffolding or other type of shielding, reducing the potential for release of fugitive emissions. However, excavation in two construction areas will be not performed under protective scaffolding: a site in the vicinity of Hanover Street in downtown Boston and a site in South Boston, to the west of the Postal Service Annex. Both of these sites are within several hundred feet of residential areas. The Hanover Street and South Boston sites encompass approximately 3.48 and 2.94 acres, respectively. The remainder of the excavation areas, since covered, will generate substantially smaller amounts of fugitive emissions. Therefore, the assessment of fugitive dust impacts will focus on the Hanover Street and South Boston excavation areas.

The Hanover Street site is identified as the open area between the Callahan Tunnel entrance and New Sudbury Street in Figure 3.25 - Central Area Construction Stage 1 of Appendix Volume 1 - Supportive Engineering in the DSEIS/R. The South Boston site is identified as "Section 4" in Figure 5.28 - So. Boston/So. Boston Bypass Road Area construction stage 4.

Fugitive dust impacts were predicted for these sites using the EPA Industrial Source Complex (ISC) dispersion model. The construction areas were modeled as area sources in accordance with EPA procedures. Receptors were at distances of 50, 100, 200, 300 and 500 meters downwind of each site. The analysis was completed using meteorological data for 1985 from Logan International Airport.

PM_{10} emission rates for 24-hour and annual periods were developed from emission factors provided in the EPA document Control of Open Fugitive Dust Sources based on activity level data provided by construction planners. Tables 20.13 and 20.14 provide the estimated contribution of various construction-related activities to PM_{10} emissions from each site, respectively. As discussed in Section 4.10.3, background PM_{10} values used in completing these analyses were 64 ~~mg~~ug/m^3 for 24-hours and 30 ~~mg~~ug/m^3 for annual average.

Results. Table 20.15 presents results of the PM_{10} modeling performed for each site. Maximum predicted concentrations plus background are generally less than (in compliance with) the NAAQS, except for the Hanover Street site for which a violation of the 24-hour PM_{10} AAQS is predicted at one receptor location. Total estimated concentration of PM_{10} at that site is 8 percent above the 24-hour PM_{10} NAAQS of 150 ug/m^3. The short-term model results presented in Table 20.15 are conservative since they are based on maximum emission rates, maximum predicted model impacts, and maximum background concentration. Since emission rates are at a maximum under high wind speed conditions, and maximum predicted impacts occur under light winds, the 24-hour results shown in Table 20.15 are likely to overestimate impacts. Twenty-four-hour ambient concentrations are, therefore, not expected to exceed 150 ~~mg~~ug/m^3.

Impacts at both construction areas decrease rapidly with distance from the site. Table 20.16 depicts how maximum predicted concentrations decrease with distance from the Hanover Street site. Pollutant concentrations at locations 100 meters from the area, for example, are approximately 60 percent of the maximum 24-hour impact which occurs 50 meters from the site. At 500 meters from the site, short-term concentrations have fallen to less than 15 percent of the maximum predicted value.

Emission factors for concrete batching developed by EPA were used to estimate the dust emissions from this plant. EPA-approved modeling procedures using the Industrial Source Complex Short-Term (ISCST) model were applied to estimate short-term 24-hour ground level particulate concentrations from operation of the concrete batch plant. The results of this analysis indicate that the peak 24-hour fine particulate matter (PM_{10}) ground level concentrations from the plant will be less than or equal to 68 micrograms per cubic meters (ug/m^3). Existing (background) levels of PM_{10} must be added to the contribution from the batch plant to determine total PM_{10} levels in the vicinity of this facility. Adding the estimated PM_{10} background value of 64 ug/m^3 to the peak PM_{10} value of 68 ug/m^3 calculated for the contribution of the batch plant, the maximum PM_{10} levels in the vicinity of the batch plants are expected to be 132 ug/m^3. This is below the 24-hour NAAQS level for PM_{10} of 150 ug/m^3.

On an annual basis, the batch plant is expected to operate less than 50 percent of the time during the project construction period. Assuming half-time operations, the maximum annual contribution of batch plant operation to PM_{10} ~~TSP~~-levels is estimated to be 17 ug/m^3. When the Annual background of 30 ug/m^3 is added, maximum expected PM_{10} levels, would be 47 ug/m^3. This is within the annual National Ambient Air Quality Standard for PM_{10} of 50 ug/m^3.

Removal/demolition of the existing structures within the construction area will result in short-term increases in particulate matter levels in the immediate vicinity of the structures. Since these demolition activities will be brief, they will not pose a threat to long-term ambient air quality levels in the area. In addition, the Department has made a commitment not to sandblast any lead-painted structures. Large hydraulic shears which can cut through highway sections like giant scissors will be utilized. This process would generate some paint chips which would have to be carefully controlled, collected and disposed of in accordance with DEP regulations.

Mitigation

Impacts of proposed construction will be mitigated by:

- Wetting of exposed, unpaved roadways and cleared areas, as practicable, to reduce wind blown and vehicular-induced dust.
- The use of wheelwash stations to reduce the amount of mud and dirt leaving unpaved areas.
- Covering of open ~~hand~~-trucks and loading operations.

As discussed in Chapter 16, peregrine falcons are known to perch on high-rise buildings in downtown Boston. While no falcons have been reported in the structure of the Charles River bridge, they are known to frequent much higher bridge structures in other cities. Removal of the existing Charles River bridge might potentially affect falcon habitat, however the replacement bridge will be completed by that time.

20.2.7 Aesthetic And Visual Considerations

Construction projects generally are not of sufficient size and duration to warrant extensive consideration of visual and aesthetic impacts and the implementation of specific visual mitigation programs. However, since construction activities for Boston's Central Artery and Third Harbor Tunnel will span some 9 years and occur throughout five major subareas, one of which is the City's downtown, the aesthetic qualities of such facilities -- even if they are temporary -- merit consideration.

Visual and aesthetic impacts generally relate to temporary changes in the environment, which can sometimes be interpreted as both positive and negative, depending on the type and extent of change, and the perception of the viewer. For example, a construction site filled with different pieces of equipment and bustling with activity can be a negative visual and aesthetic experience for some, and an exciting form of public street theater for others. Tours, viewing platforms, recorded messages, signs, maps, displays and other innovative tools to be developed during the design phase of the project will create an attraction for residents and tourists alike.

20.2.7(a) Concrete Batch Plant

A temporary concrete batch plant is planned to supplement existing facilities in the greater Boston area in East Boston. This plant will be located in what will eventually be the infield of the I-90/airport access road interchange (see Figure 20.4).

This is an open-air operation and will be in a relatively visible location. The plant will be seen by persons driving to and from the airport. It will also be visible from Terminal A, Memorial Park, and the Hilton Hotel.

20.2.7(b) Casting Basin

Because of the restrictive bridge/channel widths of the Fort Point Channel bridges, large immersed tube sections for the tunnel under the Channel will be fabricated in a casting basin on the east edge of the Channel between the shoreline and A Street (see Figure 20.6).

The facility will be located on property presently owned by Gillette and the Boston Wharf Company and will temporarily occupy a portion of the channel. It is presently used primarily for parking. The basin will be visible from a nearby six-story loft building having living/working accommodations for artists, other nearby loft buildings, Boston's main post office facility, and people crossing the Summer Street bridge at Fort Point Channel.

20.2.7(c) Construction Areas

With the exception of the Third Harbor Tunnel alignment, the entire right-of-way for the Proposed Action will, at various times, become a construction area. The appearance in this zone will vary somewhat according to location and the phase of construction. For example, a large amount of construction will be conducted below grade in an open cut, or in tunnels below decked streets. The general activity throughout all phases will, however, be similar to other highway and building construction sites, with concrete trucks and flatbed trucks making deliveries, and dump trucks ~~or a conveyor system~~ hauling away excavated material.

Portions of the construction period right-of-way not taken up by construction activity may also serve as laydown area, or for detouring traffic and rerouting pedestrians.

Table 20.10

ESTIMATED 8-HOUR WORST CASE CARBON MONOXIDE LEVELS IN 1994 WITH AND WITHOUT THE PROPOSED ACTION (ppm)

Analysis Site No.	Location	Without Project Corner	Without Project Midblock	With Project Corner	With Project Midblock
3	Leverett Circle	6.7	5.5	~~6.7~~ *7.6*	~~5.7~~ *7.3*
5	Causeway and Haverhill Streets	5.2	4.3	6.3	5.2
6	Causeway and Beverly Streets	5.1	4.3	6.2	5.2
7	North Washington and Commercial Streets	8.3	4.9	8.7	5.3
8	New Sudbury and Congress Streets	6.3	4.2	7.0	4.5
9	New Chardon/Haverhill/North Washington	4.1	4.1	4.6	4.7
10	New Chardon/Stillman/North Washington	4.6	3.7	5.2	9.0
12	North Street and Surface Road	6.5	4.6	7.2	5.2
14	Congress and State Streets	6.3	4.1	6.7	9.3
15	State Street and Surface Road	8.5	7.3	10.0	8.6
16	Summer and Purchase Streets	5.3	5.8	6.1	6.4
17	Congress and Purchase Streets	7.5	6.6	~~8.5~~ *8.6*	7.2
18	Northern and Atlantic Avenues	8.9	5.8	7.5	7.3
26	East Boston Toll Plaza	6.3	N/A	6.3	N/A
34	Cambridge and Staniford Streets	8.1	6.4	8.4	7.1
35	Summer St. and Atlantic Avenue	4.4	4.6	4.8	4.5
36	Congress Street and Atlantic Avenue	6.8	5.5	7.5	6.8
40	High Street and Surface road	7.0	5.0	9.7	6.0
41	Essex and Lincoln Streets	10.1	5.7	11.1	7.2

1. Eight-hour AAQS for Carbon Monoxide = 9 ppm
2. All values include 8-hour CO background level of 2.1 ppm
3. N/A: Not applicable

Source: Bechtel/Parsons Brinckerhoff

Table 20.11

ESTIMATED ONE-HOUR WORST CASE CARBON MONOXIDE LEVELS IN 1994 WITH AND WITHOUT THE PROPOSED ACTION (ppm)

Analysis Site No.	Location	Without Project Corner	Without Project Midblock	With Project Corner	With Project Midblock
3	Leverett Circle	11.2	9.2	~~11.2~~ *12.7*	~~9.5~~ *12.2*
5	Causeway and Haverhill Streets	8.7	7.2	10.5	8.7
6	Causeway and Beverly Streets	8.5	7.5	10.3	8.7
7	North Washington and Commercial Streets	13.8	8.2	14.5	8.8
8	New Sudbury and Congress Streets	10.5	7.0	11.7	7.5
9	New Chardon/Haverhill/North Washington	6.8	6.8	7.7	7.8
10	New Chardon/Stillman/North Washington	7.7	6.2	8.7	6.7
12	North Street and Surface Road	10.8	7.7	12.0	8.7
14	Congress and State Streets	10.5	6.8	11.2	7.2
15	State Street and Surface Road	14.2	12.2	16.7	14.3
16	Summer and Purchase Streets	8.8	9.7	10.2	10.7
17	Congress and Purchase Streets	12.5	11.0	14.2	12.0
18	Northern and Atlantic Avenues	14.8	9.7	12.5	12.2
26	East Boston Toll Plaza	10.5	N/A	10.5	N/A
34	Cambridge and Staniford Streets	13.5	10.7	14.0	11.8
35	Summer St. and Atlantic Avenue	7.3	7.7	8.0	7.5
36	Congress Street and Atlantic Avenue	11.3	9.2	12.5	11.3
40	High Street and Surface road	11.7	8.3	16.2	10.0
41	Essex and Lincoln Streets	16.8	9.5	18.5	12.0

1. One-hour AAQS for Carbon Monoxide = 35 ppm
2. All values include one-hour CO background level of 3.5 ppm
3. N/A: Not applicable

Source: Bechtel/Parsons Brinckerhoff

1.3.5 Z Modified

Weaving And Operations. Scheme Z Modified eliminates the I-93 weaves with Tobin Bridge traffic to/from Storrow Drive and lengthens the weaving distance for Callahan/Sumner Tunnel connections to/from Storrow Drive to more than 2,000 feet. It is the only scheme that provides uncongested movement on all four of these major weaves. Peak hourly travel demand on the I-93 southbound weaving section between New Chardon and Oliver Streets is forecasted to be at or over capacity, with morning and afternoon peak hourly travel speeds of 27 mph and 30 mph, respectively; these operations are slightly better than in scheme T Modified. At the three CANA ramp weave sections which occur in this option, conditions would be uncongested but constrained (LOS E) with speeds ranging between 27 mph and 40 mph, except for the AM weave to the Nashua Street ramp, which would be congested.

Table 1.5 shows merge conditions. Peak hourly congestion would be expected at the merge between I-93 southbound and the Leverett Circle on-ramp. The other mainline ramp associated with this scheme (the on-ramp from Route 1/City Square to I-93 northbound) would have PM peak hour conditions of LOS E (mainline) and F (first lane), and AM peak hour volume conditions of LOS C (mainline) and D (first lane). At the single CANA ramp merge associated with Z Modified, mainline operating conditions would be congested during the AM peak hour, but uncongested (LOS E) during the PM peak hour.

Signalized Intersection Operations. Z Modified would represent the best traffic flow characteristics at surface intersections of the four alternatives (see Table 1.6). Even after removal of Ramp W-CN, in 20 of 30 instances, AM and PM peak hour critical movement sums would be under or near probable capacity levels (compared to 22 instances before removal of Ramp W-CN). In 20 of 30 instances (i.e., intersections at AM or PM) critical movement sums would be equal to or less than those of the other alternatives (within the modeling accuracy of 50 cars per hour). (These figures assume the removal of Ramp W-CN in schemes ~~S~~-Z Modified and T Modified. This remains the best percentage of the four schemes, although not as high as before the removal of Ramp W-CN, when 25 of 30 instances were equal to or better than the other schemes.)

The Surface Artery intersection with Causeway Street (introduced when Ramp W-CN was removed to provide better traffic distribution) would have substantially lower volumes and delays than in other schemes.

The effect of removing the northbound on-ramp from Traverse Street is described in Section 1.3.6.

Travel Speed And Travel Time. As in the other options, the segment of I-93 northbound between the Sumner/Callahan Tunnel ramps and the north bank of the Charles River would experience peak hour congestion, especially during the afternoon peak as a result of the 5.3 percent upgrade. However, Z Modified was found to consistently generate the fastest travel speeds along both the north- and southbound mainlines during both peak hours (see Table 1.8). In three of the four total travel time runs analyzed, this option would have the fastest travel speeds, and in the fourth case Z Modified had a speed nearly equal to the fastest. These rapid travel speeds are the result of the limited number of weaving sections associated with this scheme (which diminishes opportunities for the buildup of queues) and the relatively smooth traffic flow found at adjacent intersections.

Similarly, on the Leverett Circle connector (see Table 1.9), Z Modified would consistently have the fastest travel speeds in both directions. From the northbound Artery, peak hour speeds would be 25 mph AM and 27 mph PM. In the direction toward the southbound Artery, they would be 28 mph AM and 33 mph PM. For the northbound to westbound movement its morning and afternoon peak hourly travel times would be the second shortest after T Modified. For the east- and southbound movement, its corresponding travel times would be the second shortest and shortest, respectively.

I-93 northbound, and 265 use the Sumner Tunnel on-ramp. These added volumes will not ~~ease~~ cause ramp failure.

Overall, the impact of removing the W-CN ramp from the Proposed Action distributes widely over the greater Boston area. A number of intersections would experience a small increase in delay time, but removal of the ramp does not represent a major service failure for any intersection.

Prior to removal of ramp W-CN (to minimize harm to Paul Revere Landing Park and navigation in the Charles River), scheme T Modified was substantially inferior to scheme Z Modified in the operation of surface intersections. Critical intersection volumes were better with scheme T Modified in only 3 of 30 instances, while scheme Z Modified was better in 21 of these instances (AM and PM conditions at the same intersection are separate instances). As traffic which formerly used the ramp seeks alternate routes, volumes at several downtown intersections change differently with schemes T Modified and Z Modified, making the schemes much closer in overall surface operating conditions than before the removal of the ramp, with scheme T Modified better in 12 instances and scheme Z Modified remains better in 13 instances (see Table 1.6).

At the Causeway Street intersection with the Surface Artery (see Table 1.7), the configuration changes in both schemes. In scheme T Modified, the northbound half of the double intersection is simplified by removal of the W-CN ramp, and after removal of the ramp, this half becomes less congested with scheme T Modified. In scheme Z Modified, the northbound Surface Artery is extended to Causeway Street to provide alternate routes for traffic formerly entering the W-CN ramp at Traverse Street. This half of the intersection operates well in both schemes, with volumes slightly lower for scheme T Modified. The southbound half of the intersection worsens in Scheme T Modified as traffic seeking alternate northbound access via Merrimac Street adds to the congestion that would have occurred even without removal of the ramp at Causeway Street. In scheme Z Modified there is PM congestion at the egress from the North Station garage; in scheme T Modified the congestion at the southbound Surface Artery is too severe to permit garage traffic to exit at peak hours, and garage traffic is forced to use the Nashua Street exit.

As discussed in Section 1.1.2(b), the removal of the W-CN ramp mitigates impacts to navigation and preserves a suitable range of bridge types without adversely affecting park and historic properties protected by Section 4(f). Pending further study of bridge types, it may be possible to re-incorporate this ramp as part of the northbound mainline bridge without further increasing the use of Section 4(f) properties described in this FSEIS/R and with no additional piers in the Charles River.

In scheme Z Modified, in which the W-CN ramp was located at Traverse Street and underpassed Causeway Street, the pedestrian environment would not be adversely affected by reincorporation of this ramp; in scheme T Modified, however, pedestrian-vehicle conflicts on Causeway Street at the entrance to Paul Revere Landing Park would result from re-introducing the W-CN ramp. For both schemes, the current Proposed Action without the ramp represents the worst-case for environmental analysis for traffic and associated impacts, as surface traffic and associated noise and air quality impacts would be marginally reduced by reincorporation of the W-CN ramp. The full range of impacts associated with the W-CN ramp was fully disclosed in the DSEIS/R.

1.3.7 Comparison Of Traffic Operations And Impacts

Each of the four options presents a different solution for access between Leverett Circle/Storrow Drive, I-93, and Route 1 for the Area North of Causeway Street. All of these options address the critical weave condition between the Sumner/Callahan on- and off-ramps and the on- and off-ramps to Route 1. However, the critical weave section occurs between the Sumner/Callahan Tunnels and Storrow Drive. Only one option (Z Modified) avoids this critical weave section. None of the options is able to eliminate the undesirable weave condition that occurs where two northbound lanes from the I-93 northbound ramp to Route 1 merge with one I-93 southbound off-

Table 1.6

SUMMARY OF INTERSECTION OPERATIONS: AREA NORTH OF CAUSEWAY STREET ALTERNATIVES ANALYSIS

Intersection	After Removal of W-CN Ramp								Prior to Removal of W-CN Ramp							
	T Modified				Z Modified (EE)				T Modified				Z Modified			
	AM		PM		AM		PM		AM		PM		AM		PM	
	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level	Crit. Vols.	Cap. Level
City Square	1,886	over	1,797	over	1,836	over	1,787	over	1,440	near	1,340	near	1,470	over	1,300	near
Leverett Circle	1,335	near	1,275	near	1,015	under	1,010	under	1,570	over	1,560	over	1,430	over	1,270	near
Causeway/Lomasney/Staniford/Merrimac	1,685	over	1,471	over	1,165	under	1,095	under	1,480	over	1,370	near	1,250	near	910	under
Causeway/Surface Artery SB	1,770	over	1,440	over	970	under	1,140	under	1,850	over	1,420	over	1,250	near	1,150	under
New Chardon/Surface Artery	1,449	over	1,065	under	1,595	over	1,215	near	1,380	near	1,180	under	1,150	under	1,240	near
New Sudbury/Surface Artery	947	under	792	under	622	under	597	under	580	under	710	under	570	under	740	under
State/Surface Artery	825	under	584	under	940	under	747	under	1,170	under	520	under	1,120	under	730	under
North/Surface Artery SB	785	under	672	under	975	under	580	under	1,300	near	1,030	under	1,080	under	1,120	under
Keany Square	1,795	over	1,702	over	1,725	over	1,837	over	1,320	near	1,630	~~near~~ *over*	1,410	over	1,630	over
Congress/New Chardon	1,468	over	1,082	under	1,490	over	984	under	1,780	over	1,230	near	1,575	over	1,170	under
Congress/New Sudbury	1,333	near	1,110	under	1,400	near	1,241	near	1,100	under	1,150	under	1,060	under	1,260	near
Oliver/Purchase	1,620	over	1,474	over	1,967	over	1,657	over	1,510	over	1,320	near	1,435	over	1,240	near
Valenti Way/Surface Artery SB	1,219	near	1,089	under	1,092	under	1,089	under	1,430	over	1,210	near	1,300	near	1,020	under
O'Brien Highway/Gilmore Bridge	2,280	over	2,240	over	2,550	over	2,250	over	2,070	over	2,120	over	2,060	over	2,050	over
Causeway/Surface Artery	785	under	672	under	860	under	722	under	1,160	under	1,340	near	N/A		N/A	

1. Critical volumes listed are sums of critical volumes
2. N/A: Not applicable
3. Key:

Maximum Sum of Critical Volumes	Capacity Level
0 to 1,200	under
1,201 to 1,400	near
>1,400	over

Source: Bechtel/Parsons Brinckerhoff

Table 1.13

TRAFFIC ANALYSIS OF REMOVAL OF RAMP W-CN: DIVERSION TO OTHER ROUTES

Route North	Volume Increase	% of Total Diversion	
Charlestown Bridge	500	25%	
I-93 NB to Chelsea/RT 1	260	13%	
I-93 NB North of CANA Ramps	300	~~14%~~	*15%*
Ramp From Storrow Drive to Rt 1	240	~~11%~~	*12%*
Ramp From Storrow Drive to I-93 NB	350	~~11%~~	*17%*
Charles River Dam	230	~~5%~~	*11%*
Longfellow Bridge	100	~~3%~~	*5%*
Other	*60*	*3%*	
Total	**2,040**	**100%**	

Source: Bechtel/Parsons Brinckerhoff

Table 1.18

SUMMARY OF COMPARATIVE OPEN SPACE IMPACTS FOR SCHEMES T MODIFIED AND Z MODIFIED

Future Baseline	Mitigated Scheme T Modified	Mitigated Scheme Z Modified
Paul Revere Landing Park South		
Partially covered by overhead structures (0.78 acre)	Uses 0.57 acres of land. Aerial use of 0.42 acres of bank structure over 235 lf of bank. Use improved by access improvements to Causeway Street and Lovejoy Wharf and removal of overhead structure, and a new bridge location further from dam.	Uses 0.61 acres of land. Aerial use of 0.45 acres of bank. Structure over 250 lf of bank. Use improved by access; improvements to Causeway Street and Lovejoy Wharf and removal of overhead structure. and a new bridge location further from dam.
	Pedestrian-vehicular conflict from Causeway exit ramp on people approaching park	Less traffic, no pedestrian vehicular conflict at Causeway Street
Paul Revere Landing Park North		
Expanded westward to include area under high level bridge; property expanded 1.1 acres by 4(f) replacement land	No use of land or air rights; property expanded 2.09 acres; Closest bridge 375' upstream of current boundary; 270' upstream of CANA replacement land; inproves visual connection to south bank; improved for passive use	No use of land or air rights; property expanded 2.05 acres; closest bridge 355' upstream of current boundary; 250' upstream of CANA replacement land; improves visual connection to south bank; improved for passive use
Dam Walkway		
High level bridge 25 to 50' upstream	Closest bridge 150 - 175' from walkway over locks; visual environment and relationship to banks improved	Closest bridge 140 - 160' from walkway over locks; visual environment and relationship to banks improved
GSA Parcel		
Some visual impact from CANA loop ramps (similar to T Mod, except for distant view of new bridges beyond MBTA railroad bridge);	Some visual impact from bridges 1,000' away and loop ramps 410 - 490' away; visual intrusion is marginally less than Z Mod; no shadow impact; noise impact requires mitigation	Some visual impact from bridges 900' away and loop ramps 340 - 420' away; ramps higher, denser than T Mod; no shadow impact; noise impact requires mitigation
Date of park improvement uncertain.	Construction impact of graving basin for tunnel section fabrication; delays park improvement 7-8 years	Park improvement can begin immediately
Charles River Basin Extension Recreation Area		
	~~Continues to be appropriate only for passage through of recreational boats~~	~~Continues to be appropriate only for passage through of recreational boats~~
Upstream of MBTA bridge designated for recreational use; appropriate for anchoring offshore Nashua and GSA parkland waterfront when these areas developed; Some visual impact from CANA ramps	Upstream of MBTA bridge: remains appropriate for recreational use and anchoring offshore Nashua and GSA parkland water-front; some visual impact from loop ramps and bridges, although visual intrusion is marginally less than Z Mod	Upstream of MBTA bridge: remains appropriate for recreational use and anchoring offshore Nashua and GSA parkland waterfront; some visual impact from loop ramps and bridges
Nashua Street parkland and Spaulding Deck		
	Subsurface easement	No use of land
Some visual impact from CANA loop ramps (similar to T Mod, except for distant view of new bridges beyond MBTA railroad bridge)	Some visual impact from loop ramps 400 - 500' away and bridges 200' away Date of construction uncertain	Some visual impact from loop ramps 400 - 500 feet away and bridges 265' away
Date of park improvement uncertain	No shadow impact: Noise impact requires mitigation	No shadow impact: Noise impact requires mitigation
	Substantial construction impact from tunnel; delays park improvement 7 years	Park improvement can begin immediately; little or no construction impact
Leverett Circle/Storrow Drive		
MDC land used for regional highway connection and MBTA Green Line station	Uses 0.64 acre of highway landscaping, removes 0.06 acre of pavement; net use 0.58 acre, but adds 0.18 acre of new landscaping	Uses 0.50 acre of highway landscaping, removes 0.20 acre of pavement; net use 0.30 acre, but adds 0.27 acre of new landscaping
	Greater air quality impact than Z Mod	No impact on playground or Esplanade walkways except noise
	Temporary detour in playground land	

Table 1.18 (Cont.)

SUMMARY OF COMPARATIVE OPEN SPACE IMPACTS FOR SCHEMES T MODIFIED AND Z MODIFIED

Future Baseline	Mitigated Scheme T Modified	Mitigated Scheme Z Modified
River Downstream of Railroad Crossing		
	Continues to be appropriate only for passage through of recreational boats	*Continues to be appropriate only for passage through of recreational boats*
Uses 0.66 acre of air over river; 4 piers in river	Uses 2.25 acres of air space over river; 6 piers in river; sight lines remain open, passage of boats not affected; shadows on 420 lf of passage wit light between bridges	Uses 3.07 acres of air space over river; 11 piers in river close to shore; sight lines remain open, passage of boats not affected; shadows on 570 lf of passage, with light between bridges
Navigation: no impact	Navigation: no impact	Navigation: no impact; additional piers on third bridge behind existing fenders at MBTA bascule bridge
Boats waiting for bridges and locks, pump intakes, and shoreline used for railroad all limit opportunities for recreational use other than passage through.		
Cana Area		
Charles River path alignment passes under high level bridge, through closely spaced piers of ramp CT and between ramps CT and TC Total length under structure is 450 lf. Length between ramps is 550 lf	Charles River path alignment improved from CANA license but under new bridges for 260', (including a gap of 40 feet to introduce light)	Charles River path alignment improved from CANA license but under new bridges for 430' (including two gaps of 40 feet to introduce light)
Landscaped area upstream of MBTA 0.48 acre	Landscaped area upstream of MBTA 0.44 acre	Landscaped area upstream of MBTA 0.31 acre
0.36 acre of riverbank shaded by bridges	0.27 acre of riverbank shaded by bridges	0.49 acre of riverbank shaded by bridges
Use: Pedestrian passage is continuous but somewhat circuitous and removed from river bank for stretches of 540' (at MBTA overpass) and 200' (at Millers River) design provides for benches along river bank at locations both immediately upstream and downstream of MBTA bridge	Use: Pedestrian passage along bank of river is unimpeded. Banks from MBTA bridge downstream to farthest edge of highway bridges (same as in Z Mod) not usable for sedentary recreational uses such as picnics; Paul Revere North is expanded upstream for such use to same extent as Z Mod	Use: Pedestrian passage along bank of river is unimpeded. Banks from MBTA bridge downstream to farthest edge of highway bridges not usable for sedentary recreational uses such as picnics; Paul Revere North is expanded upstream for such use
Millers River area landscaped for passive use, and path to Rutherford Avenue provided along ramp LT. Both Millers area and Rutherford path are separated by ramps CT, TC, and mainline viaducts	Millers River area and path from Rutherford Avenue significantly affected by overhead structures	Millers River area and path from Rutherford Avenue significantly affected by overhead structures
North Point Waterfront		
Waterfront north likely to be improved under Chapter 91 license, size and date uncertain.	1.1 acres acquired and improved as park 100 feet wide. Visual impact from bridges 700' away, and adjacent loop ramps 45' further away than in Z Mod	1.1 acres acquired and improved as park, 100 feet wide. Visual impact from bridges 600' away and adjacent loop ramps; ramps 45' closer, higher, denser than T Mod
MBTA Walkway: upstream of commuter rail		
Some visual impact from CANA loop ramps	Some visual impact from loop ramps across river and bridges 250' away, although visual intrusion is marginally less than Z Mod	Some visual impact from loop ramps and bridges 185' away
MBTA walkways: downstream of commuter rail		
Views of CANA landscaping across river and high level bridge	125 lf of riverbank walkway under bridge; views under bridges of CANA improvements, views upstream across rail yard	330 lf of riverbank walkway under bridge; views under bridges of CANA improvements, views upstream across rail yard

Source: Bechtel/Parsons Brinckerhoff

Table 1.21

COMPARISON OF LONG-TERM ENVIRONMENTAL IMPACTS

Operation	5A Modified	S Modified[2]	T Modified[2]	Z Modified[2]
Pedestrian env. on Causeway Street	Serious pedestrian/ vehicular conflict at project ramps	Off ramp to Causeway Street conflicts with pedestrian movement from MBTA	Off ramp to Causeway Street conflicts with pedestrian movement from MBTA	No ramps to/ from Causeway Street or Surface Artery Intersection
Pedestrian env. on south banks of Charles	Major impacts from tunnels and ramps on river banks, vent bldg.	Bridge wider than T Mod, vent bldg.	Bridge narrower than other options, vent bldg.	Bridge wider than T Mod, no vent bldg.
Pedestrian env. on north bank of Charles, west of I-93 mainline	Ramp adjacent to pedestrian path	Ramp adjacent to pedestrian path	Ramp adjacent to pedestrian path	Ramp adjacent to pedestrian path
Noise	Marginally worse than S & T Mods	Between T Mod and Z Mod	Slightly better than Z Mod	Marginally worse than T Mod
Water quality	Least increase in pollutant loadings due to runoff	Marginally less impact than Z Mod	Marginally less impact than Z Mod	Insignificant increases in pollutant loadings due to runoff
Vegetated wetland filled	0.01 acre	~~125 s.f.~~ *0.007 acre*	~~0.45 acre~~ *0.007 acre*	~~0.12 acre~~ *0.007 acre*
Aquatic habitat lost	1.9 acres	0.08 acre	~~0.003~~ *0.45* acre	~~0.003~~ *0.12* acre
Shading of water surface (Charles and Millers)	2.69 acres	4.76 acres prior to mitgation; 4.06 acres after mitigation	4.65 acres prior to mitigation; 3.95 with mitigation	5.66 acres prior to mitigation; 4.77 with mitigation
4(f) Impacts, Paul Revere Landing Park, South Side	Largest area taken (0.9 acre), bridge over dam	Area taken (.61 acre), bridge upstream of dam	Least area taken (.57 acre), bridge upstream of dam	Area taken (0.61 acre), bridge upstream of dam
4(f) Impacts, Paul Revere Landing Park, North Side	Overshadowed by new bridges	Improved, new bridges further than present ones	Improved, new bridges further than present ones	Improved, new bridges further than present ones
4(f) Impacts, Leverett Circle/Storrow Drive	Greatest impact on Esplanade; 0.2 acre used north of Storrow Drive	Small area changed from roadway landscaping to roadway (net 0.3 acre)	Small area changed from roadway landscaping to roadway (net 0.58 acre)	Small area changed from roadway landscaping to roadway (net 0.3 acre)
Nashua Street and GSA Parkes and recently designated Charles River recreation area	Major permanent impact due to boat section at Nashua St. edge	Constructive use due to impacts similar to Z Mod	Constructive use due to visual and noise impacts marginally less than Z Mod	Constructive use due to visual and noise impacts.
Land use - North Station area	Conflicts with Boston Garden, off-ramp impacts Causeway Street	Conflicts with Boston Garden, off-ramp impacts Causeway Street	No viaducts behind North Station, improves env. for development, conflicts with Boston Garden, off-ramp impacts on Causeway Street	Best pedestrian env. on Causeway Street, accommodates planned development
Land use-Cambridge	Ramps further from North Point than Z Mod, S Mod	Ramps closer to North Point than 5A Mod	Ramps further from North Point than Z Mod, S Mod	Ramps highest and closest to North Point
Visual impacts from Nashua Street park	Loop ramps dominant; boat sections disrupt pedestrian env. on south bank	Similar impact to Z Mod; south bank not disrupted; vent bldg south of 100 Nashua Street	Loop ramps marginally denser than 5A Mod; south bank not disrupted; vent bldg. south of 100 Nashua Street	Loop ramps and bridges highest, closest, and most dense; south bank not disrupted; no vent bldg.

Wildlife: During the period that spoil is being deposited on the island and adjacent intertidal zone, the area will be unavailable to wildlife. After the site is capped and revegetated, wildlife will be able to reinhabit the island. Reestablishment of a mammal population may take some time because mammals will have to swim from nearby areas.

Migrating shorebirds will probably respond to the loss of tidal flat by using nearby areas. Wildlife habitat values of the adjacent salt water and wetland resources would be disturbed for the duration of the project due to fugitive dust, altered runoff patterns and noise. These impacts can be lessened or avoided by proper project design and monitoring. The impact to the food value of the tidal flat that will remain near the island is discussed below.

Threatened And Endangered Species: Since species of special State or Federal concern are not known to occur at the site, impacts of landfill closure and capping activities are not an issue.

Aesthetics: Visual receptors which are most likely to be impacted by operations at Spectacle Island are Thompson and Long Island. These islands are closest within the viewshed, and would have the highest likelihood of observing changes in the island's topographic form.

However visual impacts also concern commercial craft in the President's Roads shipping ~~land~~lane and pleasure craft throughout the Harbor. Boston's Inner and Outer Harbor are unique in their historical importance and are integral to the character of the City. As such any use of Spectacle Island must be planned to preserve and enhance the picturesque nature of the Outer Harbor and to afford greater recreational opportunities.

The proposed capping of the existing refuse dump, removal of sunken barges and rubble and dredging trash from the intertidal and subtidal zones will ultimately change the topography of the island but will provide ultimate end use benefits. Regarding visual impacts however, the capping of the island will not impair the aesthetic values of the Harbor as an average expected increase of 18 feet in elevation would be almost imperceptible to persons in the viewshed.

Historical And Archaelogical Impacts: Information regarding Spectacle Island remains unchanged from the DSEIS/R, and can ~~bv~~be found in the DSEIS/R, Part II, Chapter 8B4, p. 91, regarding existing conditions, and p. 124, regarding impacts.

Physical and chemical impacts to aquatic ecosystems:

Substrate: The effects of this option on the mudflat have been described above. This option will also entail impacts on approximately 5 acres of rocky intertidal shore, 5 acres of rocky subtidal, and 15 acres of subtidal sands and silts. Of the 10 acres of rocky intertidal and subtidal, approximately 5 will be permanently impacted through conversion to terrestrial habitat and dike; the remainder of the rocky substrates, together with the sands and silts, will be removed by dredging, infilling and capping. These substrates may eventually reform through deposition and redistribution of sediments from adjacent areas. This, however, will be a long-term process.

Turbidity During Construction: Damage to substrates outside the build-plan area by deposition of suspended materials will be kept to a minimum by the sheet pile dam.

Current Patterns And Water Circulation: Given the limited extent of the permanently altered area of coastline, it is likely that any changes in tidal or current flow patterns (with consequent impacts on biotic communities) will be minimal.

Biological Impacts.
Fish, Crustaceans, Mollusks, And Other Aquatic Organisms: Approximately 10 acres of rocky intertidal and subtidal habitat dominated by gastropods, polychaetes and nematodes, with sparser

4.7.3 Disposal Sites

4.7.3(a) Massachusetts Bay Disposal Site

The Massachusetts Bay Disposal Site (MBDS), illustrated in Figure 4.1, is located in Massachusetts Bay approximately 22 nautical miles (nm) from Boston. It is 2nm in diameter and varies in depth from 159 to 304 feet. One half of the area of the MBDS overlaps the historic Massachusetts Bay Industrial Waste Site that was discontinued from use in 1977.

The MBDS currently has an interim designation by the EPA as a disposal area for dredged material. The EPA is completing an EIS to determine whether the site should continue to be used for dredged material disposal. The MBDS is composed of three general areas. The western third is the area which has been the focus of dumping of dredged materials. Along the northeast quadrant is an area of relatively coarse materials such as sand and cobbles. Between these two areas is a band of natural silt and clay. The northeast and northwest areas of the site contain shoals which rise to a depth of 57 meters. The remaining site is relatively flat and featureless. There is little evidence of significant changes in topography as a result of prior disposal.

Sediments within the dredged material area vary considerably in physical type and chemical composition due to the various harbor areas that have been dredged and disposed at this location over the past 13 years.

Detailed information regarding water quality, benthos, fisheries, and marine mammals at MBDS may be obtained from the Aquatic Resources Functions And Values, Volumes II, Material Disposal Alternatives, Bechtel/Parsons Brinckerhoff, ~~October~~ May 1990.

Threatened or endangered species which are known to frequent the general area of MBDS include the finback whale, sei whale, humpback whale, and the northern right whale.

Impacts. The disposal of approximately 271,000 cubic yards of contaminated sediment dredged from the project will result in certain impacts at the Massachusetts Bay Disposal Site (MBDS). Dredged material disposal at the MBDS could impact the water column and benthic environment. Water column impacts could occur as a result of suspended particulates or chemicals released from the sediments discharged from the barge at the disposal site. Benthic impacts could occur from the burial of a portion of the ocean floor once the discharged sediment reaches the bottom. It has been found that approximately 5 percent of fine grained dredged material discharged by barge at open water disposal sites remains in suspension shortly after the disposal event (Bokuniewicz *et al.* 1978, Morton 1984). The ultimate fate of this suspended material is somewhat unknown; however, it has been determined (Stoddard *et al.* 1985) that fine silt particles, which would be the predominant materials in suspension, settle in quiescent water at a rate of 0.7 cm/sec. Assuming a depth of 90 meters at the disposal site, it would take approximately 3.6 hours for the particulates to reach the bottom. Of course, this estimation is based on the most ideal conditions and is considered to be somewhat optimistic. Tidal and wave induced conditions will probably keep the particulate matter in suspension for a measurable amount of time which could exceed 3 hours. However, the volume of water that will be combining with the suspended particulates at the disposal site should substantially dilute the initial plume to levels that would not significantly affect water column dwelling life forms such as finfish, marine mammals, and plankton. Likewise, any chemical contaminants that may be released from the discharged sediment are expected to be sufficiently diluted to background levels by the large volume of the disposal site water column.

The disposition of dredged material on the bottom of the disposal site will result in burial of benthic organisms. This is an unavoidable and expected impact. However, it is also expected that certain organisms, such as annelids and molluseks will be able to survive the burial, especially along the thin flank of disposed material. The Corps Disposal Area Monitoring System (DAMOS)

Table 2.2

AREA NORTH OF CAUSEWAY STREET
RIGHT-OF-WAY/LAND OWNERSHIP

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf)				Temporary Construction Easements (approx. sf)	
				Fee Taking	Underground Highway Easement	Overhead Highway Easement	Taking Type* Presently Uncertain	3-Year Period or Less	More Than 3 Years
1	Comm of MA (MDPW)	Office/Parking	*F*						
2	Comm of MA (MDC)	Parking	P			57,400			
3	Comm of MA (MDPW)	Roadway/State highway							
4	Comm of MA ~~(Millers River)~~	*Millers River*	F	62,080					
5	City of Boston	Beverly St. parking	P	27,000					
6	The General Hosp. Corp	Parking	P						41,100
7	MBTA	Tracks/Platforms	P			3,900			9,200
8	Boston & Maine Corp	Vacant	P			12,600			
9	Boston Sand & Gravel Co.	Sand & gravel operations	P			102,400			
10	MBTA	Railroad track area	P			17,700			
11	Comm of MA (MDC)	Charles River	P			95,400			
12	Boston Sand & Gravel Co	Sand & gravel operations	P			35,400			
13	MBTA	Railroad track area	P						
14	Comm of MA (MDPW)	State highway-proposed							
15	Boston & Maine Corp	Wholesale/*Undeveloped*	P			28,400			
16	Comm of MA (MDC)	Sewer plumbing/ Chlorine station	P			31,900			
17	Boston & Maine Corp	Light industrial	P			77,800			
18	Comm of MA (DCPO)	Office/Inst'l	P	5,100					9,100
19	Comm of MA (MDC)	Roadway	F	15,251					
20	Comm of MA (MDC)	MBTA station	F	27,900					
21	MBTA	Railroad track area	P			10,000			
22	MBTA	Access road	P			4,000			
23	Chas Riv Pk 'A' Comp	Landscaped area	P	10,000					
24	Whittier Plc Condo Trust	Landscaped area	P	6,200					
25	Comm of MA (MDC)	Pedestrian access	P	1,200					
26	Chardon Realty Trust	Parking/~~Vacant~~ *Wharf*	P	35,300					
27	Boston Thermal Energy Corp	~~Steam~~ *Ice* Plant	P						450
28	Comm of MA (MDPW)	State highway/ Maintenance							
29	Comm of MA (MDPW)	State highway/ Maintenance							
30	Comm of MA (MDC)	Police station/Parking	P	800					
31	Comm of MA (MDC)	Pedestrian access	P	2,700					
32	Comm of MA (MDPW)	State highway							
33	Comm of MA ~~(Millers River)~~	*Millers River*	P	47,950					
34	Comm of MA (MDPW)	State highway-proposed							

1. * Uncertain whether area noted will be taking in fee or as an underground/overhead highway easement; extent of acquisition [partial (P) or full (F)] is also uncertain.

Source: Bechtel/Parsons Brinckerhoff

Table 3.2

CENTRAL AREA RIGHT-OF-WAY/LAND OWNERSHIP

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf)				Temporary Construction Easements (approx. sf)	
				Fee Taking	Underground Highway Easement	Overhead Highway Easement	Taking Type* Presently Uncertain	3-Year Period or Less	More Than 3 Years
1	City of Boston	Parking	P		53,300				
2	Comm of MA (MDPW)	Pump house							
3	City of Boston	Parking	P		28,500				
4	City of Boston	Open (construction area)	P		9,900				
5	BRA	Undeveloped	P		5,300				
6	MBTA	Railroad track area	P		5,300				
7	City of Boston	Parking	P		116,000				
8	Comm of MA (MDPW)	Pump house							
9	P & V Cucchiara, Trustees of Lisa Realty Trust		P		100				
10	City of Boston	Parking	F		721				
11	City of Boston	Parking	P		1,900				
12	City of Boston	Parking	F		6,200				
13	City of Boston	Parking	F		18,280				
14	City of Boston	Parking/Roadway	P		3,400				
15	Comm. of MA (MDPW)	Parking	F						
16	Boston Edison Co	Parking/Substation	P				26,300		
17	MTA	Roadway	P						
18	City of Boston	Open/Vacant	P		9,200				
19	JF Sullivan, Trustee for DS Parking Trust	Parking garage	P		400				
20	MTA	Roadway							
21	City of Boston	Vacant	P		49,000				
22	BRA	Retail area	P		900				
23	Comm of MA (MDPW)	Vacant							
24	City of Boston	Vacant	F	10,700					
25	BRA	Vacant	F	1,003					
26	BRA	Vacant	F	705					
27	City of Boston**	Vacant/Parking							
28	City of Boston	Vacant	F	8,103					
29	BRA	Vacant	F	2,668					
30	Comm of MA (MDPW)	Electric substation							
31	BRA	Vacant	F	6,500					
32	City of Boston	Vacant	F	7,300					
33	City of Boston	Vacant/Parking	P	300					
34	City of Boston**	Vacant/Parking							
35	City of Boston	Vacant	P	100					
36	City of Boston	Parking	F	15,700					
~~37~~	~~Comm of MA (MDPW)~~	~~Pump house~~							
38	Ft Hill Sq Phase 2 Assoc	Office	P	500					
39	BRA**	Open/Roadway							
40	Comm of MA (MDPW)	Vent building							
41	Comm of MA (MDPW)	Vent building							
42	Comm of MA (MDPW)	State highway							
43	Comm of MA (MDPW)	State highway							
44	Comm of MA (MDPW)	State highway							
45	Federal Reserve Bank of Boston	Underground parking	P	3,500					
46	Comm of MA (MDPW)	State highway							
47	Comm of MA (MDPW)	~~Vent building~~ *Fan chamber*							
48	City of Boston	Bus station	F	45,820					
49	City of Boston**	Parking							
50	Comm of MA (MDPW)	Vent building/Open							
51	MBTA	Pedestrian access	P	25,000					

1. * Uncertain whether area noted will be taking in fee or as an underground/overhead highway easement; extent of acquisition [partial (P) or full (F)] is also uncertain.

2. ** Indicates parcels within the existing highway easement line that may be required for temporary construction easements.

Source: Bechtel/Parsons Brinckerhoff

Table 4.2

I-93/I-90 INTERCHANGE/MASSACHUSETTS AVENUE INTERCHANGE RIGHT-OF-WAY/LAND OWNERSHIP

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf)				Temporary Construction Easements (approx. sf)	
				Fee Taking	Underground Highway Easement	Overhead Highway Easement	Taking Type* Presently Uncertain	3-Year Period or Less	More Than 3 Years
1	City of Boston (PFD)	Pumping station	F	5,916					
2	MTA	Roadways							
3	MBTA	Railraod ROW	P	331,950					
4	The Gillette Co.	See Chapter 5, Table 5.2							
5	Comm of MA (MDPW)	Highway ROW							
6	Comm of MA (MDPW)	Interchange Southeast Expressway/Mass. Ave. Connector							
7	Perry M. Boudreau	Industrial building rear yard	P	27,500				46,300	
8	Pro-Fac Cooperative, Inc.		P	3,000					
9	JM Whalen, Trustee of Nominee-Trust		P	400					
10	City of Boston	Railroad tracks rights	P					15,600	
11	Comm of MA (MDPW) ~~leased to Greater Boston Dist., Inc.~~	Truck loading area							
12	New Boston Food Market Development Corp.	Railroad usage	P	10,630					
13	Frontage Rd Development Corp., Inc.	Trailer truck storage/ City tow lot	P	38,830				34,600	
14	City of Boston	Vacant part maint	P	35,400				39,300	
15	Boston Edison Co.	Substation site	P	15,300				4,400	
16	240 Southampton Co., Inc	Industrial building rear yard	P	29,300					
17	240 Southampton Co., Inc	Vacant	P	4,950					
18	MBTA	Railroad ROW	F	35,509					
19	John Sax	Vacant	F	7,037					
20	~~Comm of MA (DCPO)~~ *City of Boston*	Abandoned incinerator	P	20,100					
21	Comm of MA (Ft Pt Chnl)								
22	S. Fatles, Trustee of Moore St. Realty Trust		P	3,100					
23	JA & JS Gnazzo	Auto paint shop	F	16,000					
24	S & L Fruman TC	Used metal process	F	14,800					
25	~~Owner unknown~~ *S & L Fruman TC*	*Private way*	F	5,400					
26	S & L Fruman TC	Vacant/access	P	34,700					
27	PJ Kennedy & Sons, Inc.	Plumbing supply	P	7,800					
28	BRA	Parking/access	P	4,500					
29	A & M Jacobson, Trustee Industrial Wholesale Florist & Supplies	Parking	P	29,500					
30	Boston Flower Exchange Inc.	Parking	P	3,500					
31	City of Boston	Parking	P	47,400					
32	Conrail	Railroad ROW	P	18,500		2,000			
33	Owner Unknown	Moore St priv way	P	7,500					
34	Comm of MA	Waterway (Ft Pt Chnl)							
35	U.S. Postal Service	~~Vacant/~~ Private roadway/*Postal operations*	P	95,350					
36	Penn Central Trans. Co.	Railroad ROW	P						5,100
37	Thomas J. Flatley	Billboard	F	2,304					
38	Charles A. Pappas Trustee 100 Allstate Road Trust		P	470					
39	National Railroad Passenger Corporation		P	24,810					
40	New Boston Food Market Development Corp.		P	15,410					

1. *Uncertain whether area noted will be taking in fee or as an underground/overhead highway easement. Extent of acquisition [partial (P) or full (F)] is also uncertain.

Source: Bechtel/Parsons Brinckerhoff

Table 5.2

SOUTH BOSTON/SOUTH BOSTON BYPASS ROAD RIGHT-OF-WAY/LAND OWNERSHIP

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf)				Temporary Construction Easements (approx. sf)	
				Fee Taking	Underground Highway Easement	Overhead Highway Easement	Taking Type* Presently Uncertain	3-Year Period or Less	More Than 3 Years
1	The Gillette Co.	Parking/Tank storage	P		84,100				11,500
2	Boston Wharf Co.	Parking	P		148,000			57,000	186,300
3	Comm of MA (MDPW)	Parking							
4	~~Slade Gorton Co.~~ *Comm of MA (MDPW)*	Seafood processing	F	~~14,500~~	*46,322*			~~21,822~~	
5	M. Leonard Lewis	Parking	F		~~22,570~~	*57,456*		~~34,886~~	
6	US Postal Service	Parking	P				204,890		
7	Broderick Northern Realty Trust	Vacant/Parking	F	49,407					
8	Owner Unknown	Congress St (private)	F	20,725					
9	McCourt Co., Inc.	Vacant	P	205,975					
10	New England Seafood Center Association	Seafood processing	P	6,978					
11	N.J. & K.N. Contos	Vacant/Parking	F	~~36,965~~	*42,608*				
12	Comm of MA (MDPW)	Leather business							
13	Comm of MA (MDPW)	Hoisting equipment business							
14	No Name Restaurant, Inc.	*Vacant/Parking*		*To be* taken: part of SBHR					
15	MPA	Mixed use	P				603,082		358,820
16	Fishery Products, Inc.	Seafood processing	P		2,195				
17	EDIC of Boston	Mixed office/Industrial	P	67,250	208,295			208,295	
18	Conrail	*Railroad freight operations*		*To be* taken: part of SBHR					
19	Conrail	*Railroad freight operations*		*To be* taken: part of SBHR					
21	Bianchi Associates	Bridal gown manufacture	F	20,620					
22	NJ & KN Contos	Taken-part of SBHR							
23	Conrail	Railroad ROW	P	13,490		11,920			
25	National Railroad Passenger Corp.	Railroad car storage	P	13,490		21,505			
26	National Railroad Passenger Corp.	Railroad ROW	P			14,685			
27	New Boston Food Market Development Corp.	Food storage	P			9,785		78,625	
28	MBTA	Railroad ROW	P			8,570		14,515	
29	New Boston Food Market Development Corp.	Railroad ROW	P	8,730		9,785		78,625	
30	Owner Unknown	Congress St. (private)	F	19,595					
31	House of Bianchi Inc.	Parking	F	1,486					
32	~~Comm of MA (MDPW)~~ *N.J. Contos*	~~Taken-part of SBHR~~							
33	Owner Unknown	Wormwood St. (private)	P		525				
34	~~Casey Bros.~~ *Boston Edison*	Vacant	P	14,360					24,267
~~37~~	~~Conrail~~	~~Taken-part of SBHR~~							
~~38~~	~~Owner Unknown~~	~~Passageway (private)~~	~~P~~	~~6,500~~					
40	Boston Wharf Co.	Business	P		340				
41	Owner Unknown	B Street (private)	P	5,025	9,745				

1. *Uncertain whether area noted will be taking in fee or as an underground/overhead highway easement. Extent of acquisition [partial (P) or full (F)] is also uncertain.

Source: Bechtel/Parsons Brinckerhoff

Table 7.2

EAST BOSTON/LOGAN AIRPORT RIGHT-OF-WAY/LAND OWNERSHIP

Parcel No.	Property Owner	Current Use	P/F*	Permanent Takings (approx. sf)				Temporary Construction Easements (approx. sf)	
				Fee Taking	Underground Highway Easement	Overhead Highway Easement	Taking Type* Presently Uncertain	3-Year Period or Less	More Than 3 Years
1	Ciampa ~~Realty~~ *Leasing* Corp.	*Air freight/Commercial*	~~P~~ *F*	*124,237*		~~13,200~~			
2	R Goldberg, Trustee of AJ Breman Realty Trust	*Park 'N' Fly*	~~P~~ *F*	~~35,400~~ *193,263*					
3	R Goldberg, Trustee of AJ Breman Realty Trust	*Park 'N' Fly*	~~P~~ *F*	~~16,000~~ *157,000*					
4	Consolidated Rail Corporation	*Railroad/Park 'N' Fly*	P	117,500					
4A	R.Goldberg, Trustee of Logan Communications Trust (air rights to Parcel No. 4)	*Billboard*	P	~~117,500~~ *(see Parcel 4)*					
4B	AJ Breman Realty Trust (easement rights for parking to Parcel No. 4)		P						
5	MPA	Airport Operations	P	63,300	544,870		1,619,760		1,873,000
6	MPA		P	15,500					
7	City of Boston	Playground	P					9,800	
8	City of Boston	Playground	P					4,800	
9	Comm of MA (MDPW)	Rapid Transit ROW	P	22,600				3,900	
10	MBTA								
11	RSR Realty Co., Inc.	Mixed	P	32,700				5,000	
12	Consolidated Rail Corporation	Railroad	P	5,200					

1. * Uncertain whether area noted will be taking in fee or an underground/overhead highway easement. Extent of acquisition [partial (P) or full (F)] is also uncertain.

Source: Bechtel/Parsons Brinckerhoff

Table 1.2 (Cont.)

INVENTORY OF EXISTING PARKING SUPPLY IN THE ARTERY/TUNNEL CORRIDOR[1]

Area	No.	Parcel	Capacity (parking spaces)	
Interchange Area (Cont.)	112	Rapid Press	46	
	113	Wang	140	
	114	Boston Edison	23	
	115	Albany: MALD TO RAND	35	
	116	Albany: East Berkeley to RAND	36	
	117	HUD: Oak to Harrison	25	
	118	HUD: Oak to Harvard	20	
	119	HUD: Harvard to Kneeland	2	
	120	Kneeland: Atlantic to Lincoln	5	
	121	Kneeland: Atlantic to Lincoln	15	
		Interchange Area Subtotal	~~3,713~~	*3,923*
South Boston	122	WTC A	481	
	123	WTC B	472	
	124	WTC C	658	
	125	WTC C (T)		
	126	Nagle	122	
	127	Lot A	258	
	128	Stavis	11	
	129	General Ship	246	
	130	Commercial Union	23	
	131	Jimmy's	80	
	132	US Navy	165	
	133	Pappas	100	
	134	Noymer	30	
	135	Standex	20	
	136	Contos 1	132	
	137	Contos 2	68	
	138	Contos 3	132	
	139	EDIC Lot B	41	
	140	Turner	20	
	141	Fisheries Coop		
	142	Subaru	2,200	
	143	Subaru (T)		
	144	Slade	5	
	145	Gillette	417	
	146	Boston Wharf	155	
	147	Boston Wharf	1,045	
	148	A Street (Bianchi)	130	
	149	Wormwood	200	
	150	Off Summer	40	
	151	Off Congress	57	
	152	Post Office	1,585	
	153	Post Office (TO)		
	154	Melcher	20	
	155	Cabot Yard	190	
	156	Conrail	15	
	157	A Street: BIN to Wormwood	12	
	158	A Street: BIN to Wormwood	4	
	159	Wormwood	18	
	160	A Street: Wormwood to Melcher	3	
	161	Summer to Bridge	21	
	162	Summer: Bridge to C Street	17	
	163	Summer: Bridge to C Street	3	
	164	Summer: C Street to D Street	15	
	165	Summer: C Street to D Street	2	
	166	Summer: D Street to C Street	13	
	167	Summer: C Street to Bridge	12	

Table 1.2 (Cont.)

INVENTORY OF EXISTING PARKING SUPPLY IN THE ARTERY/TUNNEL CORRIDOR[1]

Area	No.	Parcel	Capacity (parking spaces)	
South Boston (Cont.)	168	Summer: AFT Bridge	30	
	169	Summer: To A Street	23	
	170	Summer: To A Street	5	
		South Boston Subtotal	*9,296*	
East Boston	171	BIF Lot	802	
	172	Macomber	380	
	173	Mass. Tech.	35	
	174	Eastern RES	489	
	175	Eastern RES (T)		
	176	Hill Air Cargo	84	
	177	National	550	
	178	Alamo	125	
	179	Eastern Air Cargo	190	
	180	Eastern Hangar	157	
	181	Taxis 1	80	
	182	Taxis 2	68	
	183	Eastern Terminal	170	
	184	Lot C		
	185	Hilton	253	
	186	Hilton (TC)		
	187	AA Air Cargo	275	
	188	AA Hangar	113	
	189	AA Hangar (T)		
	190	Northern Terminal	70	
	191	United Kitchens	85	
	192	Pan Am Air Cargo	17	
	193	Delta Reservations	226	
	194	Behind Delta Reservations	25	
	195	Emory Air Cargo		
	196	Water's Edge	455	
	197	Hertz	140	
	198	Avis	285	
	199	Snappy	35	
	200	Airport T	110	
	201	Ciampa Realty	30	
	202	Ciampa (T)		
	203	Park & Fly	973	
	204	Orleans Street	119	
		East Boston **Subtotal**	~~15,896~~	*6,341*
		STUDY AREA TOTAL	~~10,347~~	*23,169*

1. Numbers represent existing parking capacity along corridor; project-related impacts are presented in Section 3.2.5(f) of Part I of the SEIS/R

Source: Bechtel/Parsons Brinckerhoff

Other maritime-related businesses in South Boston have also been given special consideration. Two fish processing businesses, Nagle Seafood and Stavis Seafoods, Inc., will be impacted by the project. The Department will work with the owners to fully mitigate any operational effects by making modifications to buildings (e.g., at Nagle reconfiguring the loading dock and vehicular access). The Department will also replace lost parking areas to the extent that space can be made available in the Marine Industrial Park or another appropriate location.

In the long term, land access to port areas of South Boston, East Boston and Charlestown will be enhanced, fostering development consistent with State and local land use plans and policies favoring maritime uses. Additionally, improved access from the South Boston waterfront to Logan Airport will enhance the use of this area by seafood processors.

No aspect of the project will preclude maritime-dependent uses of Fort Point Channel or other waterfront areas.

Policy R8
"For coastally dependent energy facilities, consider siting in alternative coastal locations. For non-coastally-dependent energy facilities, consider siting in areas outside of the coastal zone. Weigh the environmental and safety impacts of locating proposed energy facilities at alternative sites."

There are no coastal energy facilities proposed as part of the project.

Policy R9
"Accommodate exploration, development and production of off-shore oil and gas resources while minimizing impacts on the marine environment. . . Evaluate indigenous or alternative sources of energy (coal, wind, solar and tidal power) and off-shore mining to minimize adverse impacts on the marine environment. . ."

There is no energy source development proposed as part of the project.

Policy R10
"All developments must conform to existing applicable State and Federal requirements governing sub-surface waste discharges, sources of air and water pollution and protection of inland wetlands."

The project will comply with State and Federal air, water and wetlands regulations and requirements. Compliance with wetland, waterways and water quality requirements is discussed in this Appendix and Chapters 13 and 14. Additional information on water quality and dredging is presented in Chapters 13 and 20. Compliance with air quality standards is discussed in Part IIB-4.

Policy R11
"Support designation of scenic rivers in the coastal zone. Support designation of areas for Preservation or Restoration as 'sign-free areas.'"

The Charles and Millers Rivers are not proposed for designation as scenic rivers. There are no designated Areas for Preservation or Restoration that will be impacted by the project.

Policy R12
"Review proposed developments in or near designated or registered historic districts or sites to ensure that Federal and State actions and private actions requiring a State permit respect their preservation intent and minimize adverse impacts."

The historic resources in the vicinity of the proposed project and the impacts of the proposed project on those resources are described in Chapters 10 and 11. A variety of mitigating measures, including improved traffic management; noise, air, and vibration control; and aesthetic and joint

development measures, are described in Chapters 4 and 5. Implementation of these measures will minimize adverse impacts to the area's historic resources, and maximize the beneficial impacts of the depression of the Central Artery on the visual relationship between historic resources in downtown Boston and the North End.

Spectacle Island is listed in the National Register of Historic Places as part of the Boston Harbor Islands Archaeological District for its known and potential prehistoric archaeological resources. One prehistoric site on the island has been confirmed, and there is documentary evidence of historical activity on the island since the 17th century; however, there are no existing significant historic resources on the island. The known site warrants a data recovery operation but does not warrant preservation in place.

There are no known subsurface archaeological or historical sites within Boston Harbor that might be affected by the proposed project. As requested by the Board of Underwater Archaeological Resources, the Department will provide for archaeological monitoring of exploratory borings, dredging, and other waterside construction to identify potential resources. Should such resources be found, recovery and conservation activities will be undertaken with the guidance of the Board.

Policy R13
"Review development proposed near existing public recreation sites in order to minimize their adverse impacts."

Impacts to the Lower Charles River Basin will be mitigated by the creation of pedestrian walkways and parkland in that area. Public access along the Charles River in the North Station area and along the banks of Fort Point Channel will be significantly improved. East Boston Memorial Stadium Park will be enlarged and improved in connection with the project. Spectacle Island will be capped and made useable by the public for recreational purposes. Pedestrian access along the Freedom Trail, which crosses the project alignment, will be preserved during construction. Following construction, the absence of the elevated Central Artery will enhance pedestrian access along and the visual quality of the Freedom Trail as it crosses the project alignment. The project will result in a substantial increase in parkland and public access to the waterfront for recreational purposes. There will be no long-term impacts on recreational navigation in the Charles River, Fort Point Channel, or the Inner Harbor.

NON-REGULATORY (NR) POLICIES

Policy NR1
"Encourage and assist commercial fisheries research and development restoration and management of fishery resources, development of extensive and intensive aquaculture and enhancement of anadromous fisheries initiated at local, State and Federal levels."

Construction of the tunnel in Boston inner Harbor will temporarily preclude the setting of lobster pots in the vicinity of that work, but no long-term impacts on the lobster resource or fishery are expected. No adverse impact on other commercial fisheries or fishery resorces is expected. No long-term impacts on anadromous fisheries are expected. Proposed mitigation for Spectacle Island will include the creation of productive shellfish beds and habitat capable of supporting a productive mussel population. The perimeter will be specifically designed to include crevices and other formations to attract mollusks, lobsters and other appropriate marine life.

Policy NR2
"Ensure that State and Federally-funded public works projects proposed for location within the 100-year coastal floodplain will not exacerbate existing hazards or damage natural buffers, be

reasonably safe from flood and erosion related damage, and not promote growth and development in damage prone or buffer zones, especially in undeveloped areas of APRs."

Flood storage capacity will show net change in the lower Charles River Basin. The loss of storage capacity in Fort Point Channel is not expected to measurably impair flood control. New and replaced bulkheads will be designed to withstand coastal storms and erosion. Consistent with other State policies, economic growth and development effects of the project will be discouraged in damage prone or buffer areas.

Policy NR3
"Encourage acquisition of undeveloped hazard prone areas for conservation or recreation use, and provide technical assistance for hazard area zoning and mitigation of erosion problems."

The project will greatly facilitate the recreational use of Spectacle Island, an undeveloped harbor island. The capping of Spectacle Island will prevent further erosion and landfill leaching from that site.

Policy NR4
"Provide funding for protection from tidal flooding and erosion, emphasizing the use of non-structural measures where feasible."

No adverse effect on tidal flooding and erosion is expected from the project. The stability of vertical banks at the South Boston and East Boston portions of the tunnel alignment will be temporarily disturbed; however, the banks at these locations will be restored to their original condition. All seawalls affected by the project will be reconstructed. The capping of and improvements to Spectacle Island are expected to reduce erosion and stop leaching from that location.

Policy NR5
"Encourage, through technical assistance and review of publicly funded development, compatibility of proposed development with local community character and scenic resources."

Extensive community involvement in the post-construction use of areas within the project alignment is anticipated (See Chapter 9). The removal of the elevated Central Artery will restore physical and visual connections between downtown Boston and the waterfront and North End areas.

Policy NR6
"Promote the widest possible public benefit from Channel dredging. . . Ensure that this dredging is consistent with marine environment policies."

~~There is no Channel dredging proposed as part of this project.~~ Limited channel dredging is proposed in Fort Point Channel to deepen the channel in the vicinity of Dorchester Avenue to accommodate increased velocities during construction. Dredging in connection with the tunnel will comply with all relevant environmental regulations and policies. The top of the tunnel has been established not to interfere with maintenance dredging of Boston Harbor and so as not to preclude future deepening of the entire channel to 40 feet.

Policy NR7
"Encourage, through technical and financial assistance, expansion of water-dependent uses in designated ports and developed harbors, redevelopment of urban waterfronts and expansion of visual access."

In addition to the previously described impacts to land under the ocean, several piles will be installed to support the various new replacement bridges crossing the Channel altering less than 500 square feet of land under the ocean. The installation of the piles will not create an adverse impact on this resource area as the bridges will replace existing structures. Furthermore, approximately 800 derelict piles will be removed from the Channel as mitigation for the proposed alterations to land under the ocean resulting in less piles in the Channel postconstruction versus existing conditions.

Temporary impacts to the 420,800 square feet of land under the ocean will occur during construction and includes the dredging operation and construction of footings for Ramp K and Frontage Road NB and construction of two temporary cofferdam walls. Dredging of 240,000 cubic yards of material is necessary to construct the tunnel crossing. In addition, 9,000 cubic yards of material will be dredged to improve the flow in the channel in the vicinity of Dorchester Avenue. A temporary turbidity plume will develop but will be greatly diluted at a distance of 100 feet from the dredge. Suspended solids will rise above an assumed background level of 10 mg/l to a distance of 2,000 feet from the dredge. Silt curtains will be used to prevent adverse impacts to Gillette intake and the Channel waters. In addition, a temporary impact will be created through the creation of the casting basin.

After the Channel area is dredged to accommodate the placement of the tunnel box, a 1.1-acre (48,000 square-foot) section of the Channel adjacent to the Gillette parking area will be walled off with cofferdams and Channel water will be pumped out of the basin which is created behind the cofferdam wall. This area will be used as a casting basin to fabricate the tunnel tubes. Stone will be placed on the bottom of the basin to prevent siltation from occurring when the cofferdam wall is opened. The cofferdam wall (occupying 22,000 square feet) will be removed and the area returned to its former condition upon completion of the project. In addition, a temporary cofferdam wall will be constructed in the vicinity of Dorchester Avenue to support the temporary Dorchester Avenue and to isolate this portion of the Channel for construction of the tunnel and 2.1 acres of fill. The cofferdam wall itself will impact ~~99,500~~ 74,000 square feet of land under the ocean. No adverse impacts are anticipated as a result of these activities. This activity is further discussed in Chapter 20, Construction Activity.

During construction, the effective width of the Channel in the vicinity of the Dorchester Avenue bridge will be substantially reduced resulting in increased flow velocities during the 100-year storm event (see Chapter 13). To avoid the possibility of increased flows resulting in erosion of the adjacent coastal banks during a 100-year storm, the area will be dredged during construction from the existing depth of 10 feet below mean sea level (MSL) to approximately 15 feet below MSL in the vicinity of Dorchester Avenue. Thus the increased velocities will be mitigated through the increased depth and resultant cross-sectional area of the Channel and protection from scouring by riprap or other means of slope protection with a bank slope of approximately 4H:1V. Upon completion of the permanent Dorchester Avenue bridge, the effective width of the Channel will be enlarged as a result of the dredging and removal of the cofferdams and any increase in velocities will be accommodated. No adverse impacts to the Channel caused by erosion or scouring are anticipated as a result of the above described mitigation.

A hydraulic analysis of the Channel was conducted to determine the impacts of the fill (including tunnel box projection) on the flow baseline conditions of the Channel. The results of this analysis are summarized in Chapter 13 and conclude that no adverse impacts to the Channel will be created postconstruction. During construction, scouring of the Channel bottom during a 100-year storm event could occur as a result of increased velocity of flow. This impact will be mitigated however, through the dredging of the Channel bottom and the application of Channel protection on the easterly side of the Channel in this location.

The State wetland regulations define BVW under 310 CMR 10.55 (2)(a) as "freshwater wetlands which border on creeks, rivers, streams, ponds, and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. They are areas where the topography is low and flat, and where the soils are annually saturated." BVW is limited to a specific type of freshwater wetlands, namely wet meadows, marshes, swamps, and bogs.

The regulations state that the vegetational community which occurs in each type of freshwater wetland is specified in the act. The only plant species or category mentioned in the act which was recorded along the Charles River in the wetland area is tussock sedge (*Carex stricta*), which covered three square feet in one of the three areas sampled. Sedges (*Cyperaceae*) are listed in the act as one of the plants making up a significant portion of the vegetational community in bogs, wet meadows, and marshes. Indigobush, while not listed in the act, is listed as a facultative wetland plant in the National List of Plant Species that Occur in Wetlands. However, the area in which these wetland species are found has none of the other functions or characteristics of bogs, wet meadows, and marshes as it is a steep, artificial bank consisting of riprap.

Moreover, the act and the preamble to the 1983 regulations and the regulations themselves clearly distinguish between BVW and bank[1] as separate and distinct resource areas. The freshwater wetland definition in the act clearly differentiates between a bank and the wet meadows, marshes, swamps and bogs which comprise BVWs. 310 CMR 10.54 (2)(a) states that a bank "occurs between a water body and a vegetated bordering wetland [i.e., they do not overlap] or between a water body and an upland." Therefore, any vegetation growing on the bank is not classified as a BVW.

The wetland regulations recognize that banks, as a resource area, can be vegetated. 310 CMR 10.54 (2)(a) states, "A bank may be partially or totally vegetated" and performance standards have been established to protect the functions which banks serve in 10 CMR 10.54 (4). Although the vegetation which occurs on the bank does not qualify as BVW, it does receive appropriate regulatory protection under the performance standards for banks.

As defined in 310 CMR 10.55(2), BVW occurs on low, flat topography. However, the regulations do not provide a definition of "low and flat." In order to give a more precise meaning to "low and flat," the U.S. Soil Conservation Service soils classification was consulted to determine slope in the area containing vegetation. A slope of less than 8 percent was designated as the threshold for low and flat. The slope analysis reveals that none of the vegetated areas along the Charles River qualify as "low and flat" topographically. Moreover, because the Charles River dam retains the water level in the Charles River below 104.0 at all times and the adjacent soils consist of porous, gravelly fill, areas above this elevation do not meet the requirement of 310 CMR 10.55(2)(a) that soils be annually saturated.

In summary, the indigobush, which predominates the vegetated area of the Charles River, occurs on a steep, riprap portion of the bank of the river and does not occur where the topography is low and flat. Approximately 50 percent of the vegetation is located above the bank where the soils are not annually saturated. For the above reasons, the areas do not meet the State's regulatory criteria for classification BVWs.

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1 10 CMR 10.55 (2)(c) defines the upper boundary of the bank as "the first observable break in the slope or the mean annual flood level, whichever is lower." The mean annual flood level of the Charles River (~~104.3~~103.5) is below the first observable break in topography and is, therefore, the upper boundary of the bank along the entire river.

Standards To Protect Water-Dependent Uses: The project will not affect access by water to adjacent parcels of land. There are no existing water-dependent uses on the site, nor have there been any water-dependent uses within the past 5 years. Adjacent water-dependent uses including the Fort Point Marina, Boston Tea Party Museum, McKie Lighter, Neptune Lobster and Hook Lobster, will not be significantly affected by the proposed construction.

Standards For Nonwater-Dependent Infrastructure Facilities: To protect the water-related public interests and to provide reasonable measures for open space at the water's edge, the Department has proposed a series of mitigation measures to ensure that the public interests in this area are protected. These measures include:

- Provision of first floor retail along Atlantic Avenue within the ventilation building to provide aesthetically pleasing design and facilities of public accommodation.

- Provide full public access to and along the water within the bounds of the parcel. This pedestrian access will be appropriately landscaped and treated so as to invite the public towards the water. A minimum of 50 feet clear passageway to the water will be maintained.

- New water-dependent uses will be provided on the site where none formerly existed, including a public water transportation terminal and public landing for recreational craft.

- Provide off-site public access improvements where appropriate easements can be obtained to connect the New Northern Avenue bridge behind 470 Atlantic Avenue across the ventilation building 3 site to Congress Street, and to connect Congress Street to Summer Street. These public walkway improvements will be carried out in conformance with City of Boston Harborpark guidelines.

- Remove old rotting pilings adjacent to the Summer Street bridge which are currently posing a hazard to navigation and are a continuing source of floating debris. In addition these improvements will make the newly accessible area between Congress Street and Summer Street visually attractive.

7 NAVIGATION

7.1 Description Of Types Of Harbor Traffic

7.1.1 Recreational Boating In Boston Inner Harbor

The redevelopment of the Charlestown Navy Yard and other seaport facilities no longer suitable for cargo handling has resulted in many new recreational boating opportunities in the Inner Harbor and nearby Harbor locations. Marinas and sailing clubs flourish where shipbuilding and cargo transfer once occurred. Much of this current recreational marine traffic occurs on summer weekends. There is some sailing activity during weekdays, especially in the late afternoons. There are about 3,300 summer slips or moorings connected to marinas or clubs around the Harbor. In addition, some of the condominium complexes on the waterfront have slips available on a seasonal rental basis. A list of marinas and boat clubs is provided in Table 7.1, and their locations are depicted in ~~and~~ Figure 7.1.

7.1.2 Cruise Ships

The Black Falcon Terminal on the Reserved Channel in South Boston accommodates cruise ships calling at the Port of Boston. Most of the cruise ships call in September and October. In 1990, 12 of the 15 cruise ship calls came in those months. The number of cruise ship calls to the Port has been fairly constant over the past few years, as shown in Table 7.3.

heavy rainstorms, the combined sewer system overflows resulting in the discharge of untreated sanitary sewage and stormwater directly into the Harbor. The MWRA intends to build a deep rock tunnel storage system to hold the overflows until Deer Island can treat the discharge. Construction work is not expected to begin until 1995. The construction of the storage tunnels, drop shafts, and consolidation tunnels will require excavation of material which will be transported by barge, possibly to the Massachusetts Bay Disposal Site (MBDS). The traffic related to this development is not expected to exceed eight one-way barge trips per day at the peak period.

Additional work in Boston is being considered by the U.S. Army Corps of Engineers. They intend to dredge the channels in the ~~Chelsea and~~ Mystic Rivers and in the Reserved Channel to a depth of 40 feet. The Chelsea River will be dredged to a depth of 38 feet because there are some utility crossings which limit further dredging. The confluence of the Chelsea and Mystic Rivers will be dredged to 40 feet. This work is scheduled to commence in January 1994 and will require approximately 15 months to complete. The USACE expects to dredge some 2.1 million cubic yards of material for disposal at the MBDS. This includes about 90,000 cubic yards of rock that must be blasted in the Reserved and Mystic Channels. This blasting will necessitate additional vessels with special equipment. The Corps envisions four one-way barge trips per day in the Inner Harbor in conjunction with the disposal of the dredged material.

Another project which has been considered by USACE is the improvement dredging of the 35 feet auxiliary ship channel in the Harbor. The Harbor has a main shipping channel 1,200 feet wide of which 600 feet is 40 feet deep and 600 feet is 35 feet deep. This limits the flow of large vessels to a one-way pattern. The USACE has indicated that the dredging is not justifiable at present given the current traffic volumes. If the traffic volume should increase significantly in the future, the Corps may decide that part of the 35-foot-deep channel needs to be dredged. This partial deepening of the Channel would permit two-way ship traffic. The dredging is unlikely to occur during the construction of the Artery/Tunnel Project.

7.2 Regulatory Agencies

The Boston Harbormaster has jurisdiction over both the Inner and Outer Boston Harbor from Moon Island to Winthrop including the Harbor Islands. The Harbormaster is responsible for the issuance of temporary moorings and docking facilities, the safety of boaters, and underwater recovery. This unit is within the Boston Police Department with an office and docking facility in South Boston. The Harbormaster's office operates 24 hours per day.

The Harbor Patrol Unit of the Metro Police-Metropolitan District Commission operates 24 hours per day from offices at the end of Beverly Street adjacent to the new Charles River dam. This office has primary responsibility for marine safety along the Charles, Mystic, and Neponset Rivers, MDC beaches, and the MDC Harbor Islands. It patrols ~~from Gloucester to Hull~~Boston Harbor from East Boston to Nahant and from South Boston to Nantucket. The Harbor Patrol Unit responds to requests for assistance from coastal communities from Gloucester on the north to Cohasset on the south..

The U.S. Coast Guard maintains facilities in the Port of Boston to enforce Federal regulations for marine safety and to insure navigability of the waters under its jurisdiction. The Coast Guard also operates a search and rescue service and a Marine Environmental Response program to prevent and to respond to the discharge of hazardous cargoes into waterways in its jurisdiction. The Coast Guard's responsibility for Port safety and vessel control means that the Captain of the Port has extensive jurisdiction over the traffic in Boston Harbor. The Coast Guard publishes the Weekly Notice to Mariners to alert mariners to special situations in the Harbor which might affect navigation.

Table 5.1

ALTERATIONS TO WATER RESOURCES

Environment	Location	Duration	Purpose	Area (sf)	
Land Under the Ocean	Fort Point Channel	Temporary	Dredging	234,000	
			Cofferdam wall casting basin	22,000	
			Area isolated by casting basin	48,000	
			Cofferdam wall Dorchester Avenue	~~99,500~~	*74,052*
			Footings for Ramp K and Frontage Road NB	2,200	
			Piles for temporary bridges		
			Dorchester Avenue	21	
			Railroad bridge	87	
		Permanent	Fill for vent building and roads	91,500	
			Placement of tunnel box[1]	214,000	
			Piers for Ramp K and Frontage Road NB	400	
			Placement of piles for new bridges		
			Dorchester Avenue	17	
			Railroad bridge	57	
			Wye Connector	~~392~~	*39*
			Broadway bridge[2]	N/A	
	Boston Inner Harbor	Temporary	Dredging	560,000	
			Placement of tunnel	96,000	
		Permanent	Fill in General Ship slip	3,145	
Coastal Beach	Fort Point Channel	Temporary	Footings for Ramp K and Frontage Road NB	875	
		Permanent	Piers for Ramp K and Frontage Road NB	100	
Coastal Banks	Fort Point Channel	Temporary	Seawall removal and restoration casting basin	1,380 lf	
		Permanent	Gillette cooling water intake	–	
			Seawall west side behind new fill	1,300 lf	
			Dorchester Avenue bridge abutment (temporary and permanent)	–	
	Boston Inner Harbor	Temporary	Seawall at Subaru Pier (demolition/reconstruction)	1,485 lf	
			Seawall at Bird Island Flats	900 lf	
		Permanent	Fill in General Ship slip	300 lf	

1. Because a portion of the tunnel box will protrude above the mudline, the 4.6-acre footprint of the tunnel box and 0.3 acre of protective stone associated with this structure is considered a permanent alteration to the bottom of the Channel

2. It is assumed that the Broadway bridge will be constructed utilizing the existing substructure

3. N/A: Not applicable

Source: Bechtel/Parsons Brinckerhoff

Table 5.2

ALTERATIONS TO WETLANDS DUE TO CONSTRUCTION OF PIERS AND FOOTINGS

Environment	Location	Duration	Purpose	Area
Banks	Charles River	Temporary	Footings	100 lf
		Permanent	Piers	10 lf
	Millers River	Temporary	Piers Footings for pier placement	~~120~~ *20* lf ~~661~~ *120* lf
		Permanent	Piers	40 lf
Land Under Water	Charles River	Temporary	Cofferdams for footings	18,500 sf
		Permanent	Piers	3,500 sf
	Millers River	Temporary	Cofferdams for footings Piers	8,646 sf 500 sf
		Permanent	Piers	1,496 sf
Bordering Land Subject to Flooding	Charles River	Temporary	Cofferdams for footings	–
		Permanent	Piers	1,260 cf
	Millers River	Temporary	Cofferdams for footings	288 cf
		Permanent	Piers	1,231 cf

1. 1,540 cf of existing piers will be removed from the Charles River resulting in a net encroachment in flood storage of 1,260 cf

Source: Bechtel/Parsons Brinckerhoff

Table 5.4

TEMPORARY IMPACTS ON STATE WETLANDS RESOURCE AREAS

Region	Environment	Location	Area
Coastal	Land Under the Ocean	Fort Point Channel Boston Inner Harbor	420,800 sf 560,000 sf
	Designated Port Area	Boston Inner Harbor	462,000 sf
	Coastal Beach	Fort Point Channel	875 sf
	Coastal Dune	N/A	
	Barrier Beach	N/A	
	Coastal Bank	Fort Point Channel Boston Inner Harbor	1,380 lf 2,500 lf
	Rocky Intertidal Shore	N/A	
	Saltmarsh	N/A	
	Land Under Salt Ponds	N/A	
	Land Containing Shellfish	Fort Point Channel	875 sf
	Anadromous/Catadromous Fish Run	N/A	
	Land Subject to Tidal Action	Fort Point Channel Boston Inner Harbor	--[1] --[1]
	Land Subject to Coastal Storm Flowage	Fort Point Channel Boston Inner Harbor	--[1] --[1]
Inland	Bank	Charles River Millers River	100 ~~sf~~ *lf* ~~120 sf~~ *140 lf*
	Bordering Vegetated Wetland	N/A	
	Land Under Water	Charles River Millers River	18,500 sf 9,146 sf
	Land Subject to Flooding	Charles River Millers River	0 cy 288 cy

1. Designation for which quantities are provided in other resource areas
2. N/A: Not applicable

Source: Bechtel/Parsons Brinckerhoff

Agencies, Organizations, and Persons To Whom This Final SEIS Was Sent

List Of Agencies, Organizations, And Persons To Whom The Final SEIS Was Sent

The following Federal, State, regional, and local agencies, elected public officials, and other parties were sent copies of this Final SEIS.

Agencies

Federal Agencies

Advisory Council on Historic Preservation
Coast Guard
Department of Defense
  Army Corps of Engineers
Department of Energy
Department of Interior
  Fish and Wildlife Service
  Geological Survey
  Great Meadow National Wildlife Refuge
  National Park Service
Department of Transportation
  Federal Aviation Administration
  Federal Railroad Administration
  Urban Mass Transportation Administration
Environmental Protection Agency
Federal Emergency Management Agency
Federal Energy Regulatory Commission
Federal Reserve Bank of Boston
General Accounting Office
General Services Administration
Health and Human Services
Housing and Urban Development
National Marine Fisheries Services
Postal Service

Regional Agencies

Metropolitan Area Planning Council
Central Massachusetts Area Planning Council
Southwestern Regional Planning Agency
Metro West Growth Management Committee
South Shore Coalition

State Agencies

Office of the Governor, Commonwealth of Massachusetts
Economic Development Office
Executive Office of Administration and Finance
  Division of Capital Planning and Operations
Executive Office of Communities and Development
Executive Office of Economic Affairs
  Office of Training and Employment Policy
  State Office of Minority and Women Business Assistance

Executive Office of Environmental Affairs
- Coastal Zone Management Office
- Department of Environmental Management
- Department of Environmental Protection
- Department of Fisheries, Wildlife and Environmental Enforcement
- Division of Conservation Services
- Massachusetts Environmental Policy Act Unit
- Metropolitan District Commission

Executive Office of Public Safety
Executive Office of Transportation and Construction
- Central Transportation Planning Staff
- Massachusetts Aeronautics Commission
- Massachusetts Bay Transportation Authority
- Massachusetts Bay Transportation Authority Advisory Board
- Massachusetts Port Authority
- Massachusetts Turnpike Authority

Massachusetts Department of the State Auditor, Budget Director
Massachusetts Division of Marine Fisheries
Massachusetts Historical Commission
Massachusetts Office of the Inspector General
Massachusetts Water Resources Authority

Local Agencies

Bedford Conservation Commission
Office of the Mayor, City of Boston
Boston Business and Cultural Development Office
Boston City Clerk
Boston Conservation Commission
Boston Economic Development and Industrial Corporation
Boston Employment Commission
- Office of Jobs and Community Services

Boston Environment Department
Boston Fire Department
Boston Harbormaster
Boston Health and Hospitals Department
Boston Housing Authority
Boston Inspectional Services Department
Boston Landmarks Commission
Boston Office of Capital Planning
Boston Office of Neighborhood Services
Boston Parks and Recreation Department
Boston Police Department
Boston Public Facilities Department
Boston Public Improvement Commission
Boston Public Works Department
Boston Real Property Department
Boston Redevelopment Authority
Boston Transportation Department
Boston Water and Sewer Commission
Burlington Conservation Commission
Office of the Mayor, City of Cambridge
- Cambridge Community Development Department
- Cambridge Public Works Department

Cambridge Conservation Commission
East Boston Planning and Zoning Committee

East Brookfield Conservation Commission
Framingham Conservation Commission
Framingham Planning Department
Hull Harbor Study Committee
Hull Shellfish Warden
Spencer Conservation Committee
Town of Spencer, Water Department
Somerville Housing and Community Development Department
Weston Board of Water Commissioners
Weston Planning Board

Elected Public Officials

Federal Legislators

U.S. Senator Edward M. Kennedy
U.S. Senator John F. Kerry
U.S. Representative Chester Atkins, 5th District, Massachusetts
U.S. Representative Brian Donnelly, 11th District, Massachusetts
U.S. Representative Joseph Early, 3rd District, Massachusetts
U.S. Representative Barney Frank, 4th District, Massachusetts
U.S. Representative Joseph P. Kennedy II, 8th District, Massachusetts
U.S. Representative Edward J. Markey, 7th District, Massachusetts
U.S. Representative Nicholas Mavroules, 6th District, Massachusetts
U.S. Representative J. Joseph Moakley, 9th District, Massachusetts
U.S. Representative Richard Neal, 2nd District, Massachusetts
U.S. Representative Gerry E. Studds, 10th District, Massachusetts
Office of the U.S. Representative, 1st District, Massachusetts, Attn: Mr. Robert Gibson, Chief of Staff
U.S. Representative Nancy L. Johnson, 6th District, Connecticut
U.S. Representative Robert E. Andrews, 1st District, New Jersey

State Legislators

Senate

Amick, Carol (Bedford)
Amorello, Matthew (Grafton)
Barrett, Michael (Cambridge)
Berry, Frederick E. (Peabody)
Bertonazzi, Louis P. (Milford)
Birmingham, Tom (Chelsea)
Boverini, Walter (Lynn)
Buell, Robert C. (Boxford)
Bulger, William (Boston)
Chase, Arthur (Worcester)
Creedon, Michael (Brockton)
Dunn, Martin (Holyoke)
Durand, Robert (Marlboro)
Harold, Paul B. (Quincy)
Havern, Robert (Arlington)
Hedlund, Robert (Weymouth)
Jajuga, James (Methuen)
Keating, William R. (Sharon)
Kirby, Edward P. (Whitman)
Lane, Christopher (Medfield)
Lees, Brian (Easthampton)
Locke, David H. (Wellesley)
LoPresti, Michael (Boston)
MacLean, William Q., Jr. (Fairhaven)
McGovern, Patricia (Lawrence)
Melconian, Linda J. (Springfield)
Norton, Thomas C. (Fall River)
Olver, John (Amherst)
Owens, Bill (Roxbury)
Padula, Mary L. (Lunenburg)
Pines, Lois G. (Newton)
Rauschenbach, Henri (Brewster)
Shannon, Charles (Winchester)
Sullivan, Nancy (Lowell)
Swift, Jane Maria (Pittsfield)
Tisei, Richard (Wakefield)
Wall, Erving, Jr. (Taunton)
Wetmore, Robert D. (Barre)
White, W. Paul (Dorchester)

House of Representatives

Angelo, Steven (Saugus)
Antonioni, Robert A. (Leominster)
Binienda, John J. (Worcester)
Blanchette, Kevin P. (Lawrence)
Blute, Peter I. (Shrewsbury)
Bosley, Daniel B. (N. Adams)
Bradford, John C. (Rochester)
Brenton, Marianne (Burlington)
Brett, James (Dorchester)
Brewer, Stephen M. (Barre)
Buell, Carmen D. (Greenfield)
Bultta, Norman (Norwell)
Bump, Suzanne M. (Braintree)
Businger, John A. (Brookline)
Cabral, Antonio (New Bedford)
Cahir, Thomas S. (Bourne)
Canpiamila, Brion (Billerica)
Caron, Paul E. (Springfield)
Casey, Paul C. (Winchester)
Cass, William (Wakefield)
Catjakis, Athan (Springfield)
Cerasoli, Robert A. (Quincy)
Ciampa, Vincent (Somerville)
Clancy, Edward, Jr. (Lynn)
Clark, Forrester A., Jr. (Hamilton)
Cleven, Carol C. (Chelmsford)
Cohen, David B. (Newton)
Collaro, Andrew (Worcester)
Connolly, Edward (Everett)
Constantino, William, Jr. (Clinton)
Coon, Gary M. (Andover)
Correia, Robert (Fall River)
Cox, John F. (Lowell)
Cruz, John F. (Bridgewater)
Decas, Charles N. (Wareham)
DeFilippi, Walter A. (W. Springfield)
DeLeo, Robert (Winthrop)
Dempsey, Brian (Haverhill)
DiMasi, Salvatore F. (Boston)
Donovan, Carol (Woburn)
Doran, Stephen W. (Lexington)
Draisen, Marc (Boston)
Driscoll, John R. (Northbridge)
Evans, Nancy (Wayland)
Finneran, Thomas (Boston)
Fitzgerald, Kevin (Boston)
Flaherty, Charles (Cambridge)
Forman, Peter (Plymouth)
Fox, Gloria (Roxbury)
Galvin, William (Boston)
Galvin, William C. (Canton)
Gannon, Paul (South Boston)
Gardner, Barbara (Holliston)
Gately, David F. (Waltham)
George, John (Dartmouth)
Gibson, Mary Jane (Belmont)
Giglio, Anthony (Medford)
Giordano, Larry F. (Methuen)
Glodis, William J. (Worcester)
Gopuen, Emile (Fitchburg)
Gray, Barbara E. (Framingham)
Haiey, Paul (Weymouth)
Hall, Geoffrey (Westford)
Harkins, Lida (Needham)
Hawke, Robert (Gardner)
Hayward, Jeffrey (Lynn)
Healy, Jonathan L. (Charlemont)
Henry, James (Beverly)
Hermann, Joseph N. (Andover)
Herren, Albert (Fall River)
Hildt, Barbara (Amesbury)
Hodgkins, Christopher J. (Lee)
Holland, Iris K. (Longmeadow)
Honan, Kevin (Brighton)
Hornblower, Augusta (Groton)
Howarth, Robert L. (Springfield)
Hynes, Frank M. (Marshfield)
Jehien, Patricia (Somerville)
Jordan, Raymond, Jr. (Springfield)
Kafka, Louis L. (Sharon)
Karol, Stephen J. (Attleboro)
Kehoe, Marie-Louise (Dedham)
Kelly, Shaun (Adams)
Kennedy, Thomas P. (Brockton)
Kerans, Sally (Danvers)
Klimm, John (Barnstable)
Knapik, Michael (Westfield)
Koczera, Robert (New Bedford)
Kollios, Paul (Millbury)
Kraus, Robert (Kingston)
Krekorian, Robert (Reading)
Lambert, Edward (Fall River)
Landers, Patrick F., III (Palmer)
Larkin, Peter J. (Pittsfield)
Lawless, Robert C. (Orleans)
LeLacheur, Edward A. (Lowell)
Lemanski, Kenneth M. (Chicopee)
Lewis, Jacqueline (Bridgewater)
Lionett, David J. (Worcester)
Magnani, David P. (Framingham)
Mandile, Anthony (Waltham)
Mann, Charles W. (Hanson)
Manning, M. Joseph (Milton)
Mara, Francis G. (Brockton)
Marsh, Robert H. (Wellesley)
Marzilli, Jim (Arlington)

McDonough, John (Boston)
McIntyre, Joseph (New Bedford)
McKenna, Mary Jane (Holden)
McNeil, John C. (Malden)
Menard, Joan M. (Somerset)
Merced, Nelson (Dorchester)
Miceli, James R. (Wilmington)
Moore, Richard T. (Uxbridge)
Morrissey, Michael W. (Quincy)
Murray, Mary Jeanette (Cohasset)
Nagle, William P., Jr. (Northampton)
O'Brien, Shannon P. (Easthampton)
O'Leary, Timothy F. (Melrose)
O'Sullivan, Kevin (Worcester)
Owens-Hicks, Shirley (Boston)
Pacheco, Marc (Taunton)
Palumbo, Thomas G. (Newbury)
Parente, Marie J. (Milford)
Peters, David (Charlton)
Petersen, Doug (Marblehead)
Petrolati, Thomas M. (Ludlow)
Poirier, Kevin (N. Attleboro)
Ranieri, Daniel J. (Bellingham)
Reinstein, William G. (Revere)
Resor, Pamela (Acton)
Rohan, Robert J. (Holyoke)
Roosevelt, Mark (Boston)
Rosenburg, Stanley C. (Amherst)
Rourke, Susan F. (Lowell)
Ruane, J. Michael (Salem)
Rushing, Byron (Boston)
Scaccia, Angelo (Boston)
Schur, Susan D. (Newton)
Scibelli, Anthony M. (Springfield)
Serra, Emanuel Gus (Boston)
Stoddart, Douglas (Natick)
Sullivan, Grepory W. (Norwood)
Sullivan, Michael (Abington)
Tarr, Bruce (Gloucester)
Teague, Edward B., III (Yarmouth)
Thompson, Alvin (Cambridge)
Tobin, Arthur Stephen (Quincy)
Tolman, Warren (Watertown)
Travis, Philip (Rehoboth)
Turkington, Eric (Falmouth)
Valianti, Daniel (Marlboro)
Vellucci, Peter A. (Cambridge)
Vernon, William B. (Mansfield)
Voke, Richard (Chelsea)
Walrath, Patricia A. (Stow)
Walsh, Marian (West Roxbury)
Walsh, Michael P. (Agawam)
Walsh, Thomas P. (Peabody)
Woodward, Francis H. (Walpole)

Local Elected Public Officials

Boston City Councillors

Bolling, Bruce
Byrne, James
Hennigan-Casey, Maura
Iannella, Christopher
Kelly, James
McCormack, Michael
McLaughlin, Brian
Menino, Thomas
O'Neil, Albert
Salerno, Rosaria
Scondras, David
Travaglini, Robert
Yancey, Charles

Cambridge City Councillors

Cyr, Edward
Duehay, Francis
Myers, Jonathan
Reeves, Kenneth
Russell, Sheila
Sullivan, Walter
Toomey, Timothy
Walsh, William
Wolf, Alice

Organizations

Municipalities

Arlington, Administrator
Bedford, Administrator
Belmont, Administrator
Beverly, Mayor
Braintree, Administrator
Brookfield, Administrator
Brookline, Administrator
Chelsea, Mayor

Danvers, Administrator
Dedham, Administrator
East Brookfield, Administrator
Gloucester, Mayor
Hingham, Board of Selectmen
Hull, Administrator
Lexington, Administrator
Lynn, Mayor
Malden, Mayor
Manchester, Administrator
Marblehead, Administrator
Medford, Mayor
Melrose, Mayor
Milton, Administrator
Nahant, Administrator
Needham, Administrator
Newton, Mayor
Peabody, Mayor
Quincy, Mayor
Revere, Mayor
Salem, Mayor
Saugus, Administrator
Somerville, Mayor
Spencer, Board of Selectmen
Stoneham, Administrator
Town of Wellfleet
Wakefield, Administrator
Waltham, Mayor
Watertown, Mayor
Wayland, Board of Selectmen
Wellesley, Administrator
Weston, Board of Selectmen
Weymouth, Administrator
Winchester, Administrator
Winthrop, Mayor
Woburn, Mayor

Libraries

Barber Engineering Library
Bedford Public Library
Boston Public Libraries
- Main Library, 666 Boylston Street
- Charlestown Branch, 179 Main Street
- East Boston, 276 Meridian Street
- East Boston, Orient Heights
- Kirstein, 20 City Hall Avenue
- North End, 25 Parmenter Street
- South Boston, 646 East Broadway
- South End, 685 Tremont Street
- West End, 151 Cambridge Street

Boston Redevelopment Authority Library
Bostonian Society Library
Brookline Public Library, 361 Washington Street
Cambridge Public Library
- Main Branch, 449 Broadway
- Heritage Center Branch, 48 Sixth Street
- Valente Branch Library, 826 Cambridge Street

East Brookfield Public Library
Hingham Public Library
Hull Public Library
Lexington Public Library
Malden Public Library
Marshfield Library
Massachusetts Institute of Technology, Rotch Library
Revere Public Library
Richard Sugden Library, Spencer, Massachusetts
Sandwich Public Library
Somerville Public Library, 79 Highland Avenue
State House Library
Transportation Building Library, 10 Park Plaza
Weymouth Library
Winthrop Public Library

Businesses, Organizations, and Individuals

1000 Friends of Massachusetts
103 Allstate Trust
470 Atlantic Ave. Management Corp.
A.D. Hilyer & Co.
A.J. Bremen Realty Trust
Abramo Fish Co., Limited Partnership
AFCED-AEQ
Aiello, Joseph and Mary
Airport Impact Relief (Air, Inc.)
Airport Operators Council International
Alberti, Ms. Marina
Aleppo Shrine Yacht Club
Alexander, Mr. K.E.
Alford, Ms. Jane
Allen, Demurgian, Major and Nitsch
Allen, John S.
Allen, Mr. Duncan
Alper, Mr.
Alschuler, Ms. Karen
Amadei, Mr. Arthur
American Automobile Association
American Bus Association
American Consulting Engineers Council of New England
American Lung Association of Massachusetts
American Planning Association, Massachusetts Section
Amtrak
Andelman, Mr. David
Anderson Associates
Andreson Nichols, Inc.
Andrew Square Civic Association
Antique Yachting Etc.
Antronics, Inc.
Architects Collaborative
Aristide, Mr. David
Arrowstreet, Inc.
Artery Business Committee
Arthur D. Little
Arthur Gomez
Asian Community Development Corp.
Asian/American Resource Workshop
Askanase, Ms. Debbie
Associated General Contractors
Associated Industries of Massachusetts
Association for Public Transportation
ATEX, Inc.
Atlantic Ave. Abutters Group
Aumann, Mr. Herbert M.
Bahne, Charles
Baker, Ms. Blair H.
Barker Steel Co.
Barre Conservation Commission
Barrett, Ms. Tish
Barron, Mr. Edward R.
Bates Brother Serris Face Granite Co.
Bay State Steamship Company
Beacon Companies
Beacon Hill Civic Association
Beal Companies/Artery Business Committee/Industrial Finance Agency
Bebchick, Mr. Les L.
Bechtel Power
Bedard, Mr. Charles Spencer
Bedford League of Women Voters
Bedford Open Space Commitee
Bellanti, Ms. Annette
Bennet, Mr. Pratt
Bennett Investment Properties
Bennett Investment Properties
Bennett, Ms. Melissa
Berger Associates
Berger, Mr. Philip
Bergmeyer Associates
Berke, Mr. Steven
Berman Co., The
Berman, Mr. Roger
Bernard, Mr. Michael M.
BGS Systems, Inc.
Biersteker, Mr. Dale
Bikes Not Bombs
Biockelman, Mr. Paul
Birmingham Properties
Bjocklund, Ms. Doris
Black, Ms. Deborah
Bluestone, Mr. Larry
Bodzin, Mr. Steve
Boger, Ms. Cathy
Bolger, Mr. Michael
Bolognese, Ms. Angela
Bond, Schoeneck & King
Boscom (World Trade Center)
Boston & Main Corporation
Boston Area Bicycle Coalition
Boston Aviation Council
Boston Brotherhood of Taxi Drivers
Boston Building Council
Boston Business Journal
Boston District Council Carpenters
Boston Edison Company
Boston Financial Consulting Group
Boston Financial Group
Boston Flower Exchange, Inc.

Boston Freight Terminals
Boston Gas Company
Boston Greenspace Alliance
Boston Harbor Associates
Boston Harbor Industrial Corporation
Boston Preservation Alliance
Boston Sand & Gravel
Boston Society of Architects
Boston Society of Landscape Architects
Boston Symphony Orchestra
Boston Tea Party Ship & Museum
Boston Thermal Energy Corporation
Boston Typographical Union No. 13
Boston Waterfront Neighborhood Association
Boston Wharf Company
Boudreau, Perry
Bowen, Mr. Jim
Bracken, Mr. Thomas
Bradford, Mr. Robert G.
Braman Dow & Co.
Breater Boston Hotel Association
Brem, Mr. Jeffrey
Bricklayers Union, Boston Local
Brigell, Mr. Bruce (Marshfield Library)
Brooks, Mr. Arthur
Brown Rudnick, Freed Gesmer
Brown, Mr. and Mrs. Gary
Bruce Compbell & Associates
Bruno, Mr. Bruno
Building and Construction Trades Council of the Metropolitan District
Building Opportunities Apprentice Preparedness Program
Burns, Ms. Valerie
Buts, Ms. Pamela
Cablevision of Boston
Cabot Cabot & Forbes Realty Advisors
Callaghan, Mr. Thomas
Callahan, Ms. Isabella
Cambridge Chamber of Commerce
Cambridge Environmental Citizens Organization
Cambridge Republican City Committee
Camp International Holding, Inc.
Campbell, Mr. Gordon
Campbell, Mr. Robert
Can-Do Alliance (c/o Archdiocese of Boston)
Cannata, Mr. Tony
Capola, Mr. Joseph
Carangelo, Mr. Ferdinand
CARAVAN for Commuters
Cardinale, Mr. Pete
Carey, Mr. Paul
Cargill Masterman & Culbert
Caribou Fisheries
Carpenter-Carpenter
Carpenters District Council of Boston
Carter, Mr. David
Carter, Ms. Irma C.
Cashman Marine Enterprises
Cashman, Jack
Cass, Mr. William F.
Castle Metals Co./B.L.S. Inc.
Catino, Ms. Mary
Cecere, Mr. Anthony
Center for Environmental Studies
Century Engineering, Inc.
Chardon Realty Corporation
Chardon Realty Trust
Charles River Park "A" Company
Charles River Park Association
Charles River Park Management
Charles River Watershed Association
Charles T. Main
Charlestown N.A.T.F.
Chase, Mr. Raymond
Children's Museum
Childs Bertman Tseckares & Casendino
China Housing and Land Development Task Force
Chinatown/South Cove Neighborhood Council
Chinese Consolidated Benevolent Association
Chinese Economic Development Council
Chinese Merchants Association
Cho, Ms. Yee
Choate, Hall and Stewart
Christopher Columbus Plaza Senior Citizens
Christopher, Ms. Alice
Ciampa Leasing Corporation
Cipriano, Ms. Theresa
Circeo, Mr. A.
Citizens Opposed to the Bedford Landfill Site
City Life Boston, Inc.
City Waterfront Association
Claffey, Mr. Jim
Clark, Mr. Jim
Coalition Against Third Harbor Tunnel
Cocozzoli, Mr. Thomas E.
Cohen, Mr. Gary
Coldwell Banker Commercial
Commercial Union Insurance Co.
Communitas, Inc.
Computer Museum
Conant, Mr. Donald R.

Congress Group Ventures Inc.
Connors, Mr. Donald
Conservation Law Foundation
Consilvio, Mr. Francis T.
Consolidated Rail Corporation (Conrail)
Consolidated Rail Corporation (Phil.) (2)
Construction Industries of Massachusetts
Consulting Engineering Group, Inc.
Conte, Mr. Frank
Contos, N.J. and K.M.
Cook, Mr. Paul
Cooperative Corporation
Cope Associates
Corbin, Mr. John
Corcoran, John M. & Company
Corporate Legal Service
Corrigan, Ms. Mary
Cortese, Dr. Anthony
Costello, Mr. Robert
Cott, Mr. Lee
Cotter, Mr. Kevin L.
Coughlin, Mr. William
Crafts, Mr. Jeffrey
Cross, E.C.
Cruz-Burke, Diane
CSI Resource Systems, Inc.
Cucchiara, Peter, Trustee
Cuccinello, Ms. Dian
Cuddy, Lynch, Manzi, Bixby
Cummings, Mr. Francis
Cummings, Mr. Robert
Curbstone Newspaper
Curtis, Mr. Paul
Cushman & Wakefield
Cutler, Mr. Peter
D'Agostino, Mr. Edward J.
D'Amico, Bob
D'Amico, Mr. Robert
D.S. Parking Trust
Damecy, Ms. Nancy L.
Dana, Mr. Marshall
Dauer, Mr. Christopher D.
Dave's Motor Transportation, Inc.
David Dixon & Associates
De Feo, Mr. Jim
DeAngelis, Ms. Edith
Debole, Mr. Paul
Deer, Ms. Laura
Deluty, Mr. Michael
Dempsey, Matthew
Department of Social Services (Airport)
DePaulo, Mr. Sonny
Design Guild
Design-Science International
DeStefano, Mr. Oscar
DeVeber, Peter & Jean C.
Developer, International Place/Artery Business Committee
DiCara Selig Sawyer & Holt
DiLibero, Nick and Maria
DiLorenzo, Mr. George
DiZio, Mr. Paul
DJK Associates
Doherty, Mr. Joseph
Donaher, Ms. Cathy
Donovan, Mr. Jim
Dorchester Alliance Neighborhood Association
Dorchester Avenue Taxpayers Association (DATA), Attn: A. Wang
Dosh, Mr. Michael J.
Downtown Crossing Association
Downtown North Association
Downtown North Association/Steffian Bradley Associates
Dunderdale, Ms. Lena
Eagle Hill Civic Association
Earthworks/(Jamaica Plain resident)
East Boston Area Planning Action Council
East Boston Chamber of Commerce
East Boston Community Development
East Boston Community Health Committee, Inc.
East Boston Community Information Center
East Boston Concerned Citizens Association
East Boston Courthouse
East Boston Harborside Community School/(East Boston resident)
East Boston Land Use Council
East Boston Neighborhood Health Center
East Boston Savings Bank
East Boston Social Centers
East Boston Sun-Transcript
East Boston Times - Free Press
East Boston Veterans Council
Eastern Airlines
Ebasco Services, Inc.
Ebaseo Services
Ecumenical Community Council
Edwards & Kelcey, Inc.
Eggert, Ms. Lori
Electronic Systems Assoc.
Elevators Constructors Union, Boston Local
Ellis Neighborhood Association
Elwood, Mr. John R.
Emerson, Mr. Bob

Endless Communications
Engstrom, Mr. William
Environmental Futures
Environmental Lobby of Massachusetts
Equitable Real Estate
Evans, Mr. Eric
Factory Mutual Research Corp.
Fager, Mr. Michael
Falcone, Mr. Joseph F.
Fallon, Hines, O'Connor
Faneuil Hall Market Place
Fatles, Saul
Fawcett, Betsy
Federal Reserve Bank of Boston
Feeney, Elizabeth M.
Ferri, Mr. Mark
Ferrulo, Mr. & Mrs. William & Lucy
Fidelity Capital/Artery Business Committee
Fifield, John
Filoso, Mr. Andy
Fincham Associates
Fiore, Ms. Elsie
First Sterling Corporation
Fishery Products, Inc.
Flatley Company, The
Forgione, Mr. Martin
Fort Hill Square Phase III Associates
Fort Point Arts Community
Fort Point Channel Business Property Owners and Tenants Association
Fort Point Channel Citizens Advisory Committee
Foster, David
Foundation of Japan, Express Highway Research
Fraggos, Mr. Charles
Francis, Ms. Marilyn A.
Franklin & Lienhard Consulting Eng.
Fraser, Mr. Jim
Frazier, Mr. Clark
Frechette, Mr. Al
Friedlander, Mr. James M.
Friedman & Atherton
Friends of Post Office Square
Friends of the Boston Harbor Islands
Froio, James
Frontage Development Corporation
Frost, Mr. Doug
Fruman, Sidney
Furrer, Ms. Jeannine K.
Gage, Mr. William T.
Gallagher, Mr. Phil
Gallagher, Ms. Josephine B.
Gannett Fleming Corddry & Carpenter
Ganns, Mr. George F.
Gaston Snow & Ely Bartlett
GCA Engineers Association
GEI Consultants
General Hospital Corporation
Geotechnical Engineers, Inc.
Giffee, Mr. Phil
Gifford, Pebble
Giller, Ms. Phyllis
Gillette Company
Ginsburg, Mr. Arnold
Gioiosa, Ms. Josephine
Giorgio, Mr. Ralph
Giuliene, Mr. Louis
Glynn, Astrid, Esq.
Gnazzo, Jerold A.
Gold, Mr. David
Goldberg, Mr. Richard
Goldberg, Zoino & Associates, Inc.
Gomberg, Mr. Tooker
Gore Street Citizens Committee
Gorove Slade Associates
Gowell, Ms. Elizabeth
Gray, Mr. John R.
Gray, Mr. Justin
Great Northern FND
Great Northern Industry
Greater Boston Chamber of Commerce
Greater Boston Community Development Corp.
Greater Boston Convention & Visitors Bureau
Greene, C.F.
Greenwood, Mr. J.B.
Gregory, Ms. Kathe
Grey Line, Inc.
Grove Street Citizens Committee
Grow Tunneling Corp.
Gruel, Mr. Ozan
Guildford Transportation
Gunther Engineering
Gunwgn Company, The
H.N. Gorin Associates
H.W. Lochner, Inc.
Hagan, Mr. Tod
Hale and Dorr
Hale, Mr. Robert
Haley & Aldrich
Hall and Barlow
Hall-Burbine, Ms. Susan E.
Halvorson Company
Hamaker, Mr. Noble
Hamlin, Collier, Thompson & Doyle
Hammond, Mr. Joseph
Hanson Engineering

Harbor Towers Condominium I
Harborpark Advisory Committee
Harborside Community School
Harkins, Ms. Annette
Harris, A.H. & Sons, Inc.
Harris, Mr. Frederic R.
Hartman, Mr. Fredrick
Harvard Graduate School of Design
Harvey, Mr. Paul
Haymarket Pushcart Association
Heinrich Mr. Richard S.
Hines Interests
Hinkle, Joseph
Hislop, Mr. Gordon
Historic Neighborhood Foundation
HMM Associates
HNTB
Hoffman, Ms. Cheryl McCarter
Hogan, Mr. Ed
Holy Redeemer Church
Homart Development Corp.
Hooper, Ann
Hotel Management & Development, Inc.
House of Bianchi, Inc.
House of Representatives Transportation Committee
Howry, Mr. Jeff
Huang, Mr. Kuen Shen
Hunneman Real Estate
Hurley, Ms. Marie
Hurst, Ms. Vicki
Insulators and Asbestors Workers Union, Boston
Int. Union of Oper. Engrs. L.U. #4
International Brotherhood of Electrical Workers Local 103
Intersystems Corporation
Ironworkers Union Local No. 7, Boston
Israel, Carl B., Esq.
Ives, Mr. Jerry
Izzo, Ms. Elizabeth
J.F. White Contracting Co.
Jacobson, A&M, Trustee
Jager, Smith, Stetler & Arunta
James Hook & Company
Jeffries Point Neighborhood Committee
Jets Club
JHKE Associates
John Drew Company
John M. Corcoran & Co.
John Reilly Association
Johnson, Betsy
Johnson, Mr. Jim
Kahaiyan, Mr. Michael E.
Kaiser, Mr. Steve
Karp, Mr. Allen
Kaufman, Jay R.
Kehoe, Mr. Peter
Kennedy & Son, Inc.
Kennedy, Mr. Paul
Kenney Development Co.
Kerwin, Ms. Anne M.
Kiely, Ms. Mary Ann
Kimley-Horn & Associates, Inc.
King, Mr. Daniel T.
Kittredge, Mr. Stanley M.
Klibacas, Mr. D.
Kramer, Mr. Bernard
Kruger, Mr. Christopher
Kunlan, Mr. David
Kuttner, Mr. Bill
Laborers Union Local 223, Boston
Lamans, Pat
LaMattina, Mr. Sal
Langley, Mr. Samuel
Langone, Mr. Fred
Lasalle Partners
Laventhal & Horworth
League of Women Voters Boston
League of Women Voters Waltham
Leahy, Mr. Tim
Leathall, Thomas
Leay, Ms. Janice
Lechover, H.W. Inc.
Leers, Weinzapfel Associates
Leg. Post Office, State House
Leggat Company, The
Leiman, Kathleen E.
Lenz Engineering
Leonardi, Mr. Ron
Lewis, Ms. Louise
Lighty, Mr. Bruce D.
Limbach Company
Lisa Realty Trust
Liverpool Lumber
Local 82
Loewenstein, Mr. Ernest
Logan International Park East
Logue, Mr. Edward J.
Lombardo, Mr. Sal
Loving, David
Macomber Development Company
Mader, Ms. Bernice
Mahoney, Hawkes & Goldings
Maine Department of Transportation Legal Division
Malone, Mr. K. Robert
Maloof, Dr. Sam
Maloof, Mr. Ferris
Mangani, Mr. Albert

Manning, Mr. Paul W.
Maramaldi, Ms. Diane
Marchi, Ms. Diane
Marchi, Ms. Roberta
Marchione, Mr. Nick
Markis, Ms. Delphine
Marullo & Barnes
MASCO
Massachusetts AFL/CIO
Massachusetts Association of Conservation Commissions
Massachusetts Audubon Society
Massachusetts Bay Marine studies Consortium (UMass)
Massachusetts Business Roundtable
Massachusetts General Hospital
Massachusetts Highway Users Conference
Massachusetts Laborer's District Council
Massachusetts Section
Massaro, Mr. Frederick
MassPirg
Massport (Personnel)
Masterman, Edward, Esq.
Masterman, Mr. James
Mastrangelo, Mr. Vito
Mather, Mr. Edward
Mathews, Mr. DeForest G.
Maverick Tenants' Council
Mayor's North End/Waterfront Neighborhood Council
Mayor's Office of Neighborhood Services
MBTA, Real Estate Division
McCaffrey, Mr. Jay
McCarter Hoffman, Ms. Cheryl
McCourt Company
McDonald, Ms. Janici L.
McDonnell Douglas
McDonough, Steven
McFarland Associates
McGinley Hart Associates
McGrath Sylva & Associates
McGregor, Shea & Doliner
McKinon, Anne
Megna, Mr. Bobby
Mercantile Wharf Association
Meredith & Grew
Merlino, Mr. Thomas
Metcalf & Eddy
Metro Toronto Roads & Traffic Department
Metropolitan Affairs Council
Metrowest Growth Management Committee
Meyers, John
Mieth, Ms. Carolyn
Mighigan State Univerisy (School of Urban Planning)
Milczarek, Ms. Maria
Miller, Mr. Marvin
Miller, Ms. Gail
Millian, Mr. Richard
Minihan, Agnes
Mintz Associates Architects/Planners, Inc.
Mintz, Levin, Cohm, Feffis
Mironer, Mr. Alan
MIT Laboratory for Computer Science
Modica, Ms. Diane
Montepare, Joann M., Ph.D.
Moody, Ms. Rhett
Moore, Mr. William A.
Moran, Mr. Michael K.
Morash, Ms. Evelyn
Morgan, Mr. Jeff
Morgan, Mr. Michael
Morrison, Mr. Robert H.
Moshe Safdie & Associates
Moulison, Ms. Linda
Mucci-O'Shea, Marie
Munch, Mr. Stephen
Murphy, DeMarco & O'Neil, P.C.
Murray, Sheri
Museum Wharf
Mystic River Watershed Association
N.E.N.W.C.
N.O.A.H.
Nalchajian, Ms. Lisa
Napoli Companies, Inc.
National Car Rental System, Inc.
National Railroad Passenger Corporation (Amtrak)
National Relocation
National Trade
National Trust
Natti, Ms. Susanna
Neighborhood Association of Back Bay
New Boston Food Market
New Boston Garden Corporation
New England Aquarium
New England Aquarium (Conservation Department)
New England Council, Inc.
New England Legal Foundation
New England Seafood
New England Telephone Company
New Jersey Department of Transportation
New York State Office of Parks & Recreation
No Name Restaurant, Inc.
Norfolk Central Labor Council

Norris, Mr. Kermit
North Area Task Force
North Area Task Force/(Charlestown resident)
North Bennet Street School
North Coast Seafood
North End Neighborhood Council
North End Nursing Home
North End Waterfront Neighborhood Council
North Suburban Chamber of Commerce
Northeastern University
Northland Investment Company
Northridge Development Company, Inc.
Noymer Manufacturing Company
Nucci Vine Assoc., Inc.
Nucci, Mr. John
O'Connell, Ms. Sandra
O'Leary, Jim
O'Neal, Mr. Tim
O'Shea, Ms. Marie Mucci
O.H. Community Center
Oberg, Ms. Stephanie
Office of the Senate President
Old North Church
Old South Meeting House
One Hundred Fifty (150) Trust
OPCD, Mr. Tom Sweeney
Operating Engineers, Boston Local
Organ, Mr. George S.
Orient Heights Community Center
Orient Heights Improvement Organization
Orient Heights Neighborhood Organization
Orion Research Incorporated
Orlandi, Mr. Roland
Our Lady of Mount Carmel Church
Our Lady of the Airway Chapel
P & P Realty Company
Painters District Council 35
Palladino, Ms. Elvira Pixie
Palma, Ms. Sue
Palmatier, Ms. Roxanne
Palmer & Dodge
Panorama Products
Paris Street Gym
Park Avenue Realty
Park-N-Fly
Parker, Coulter, Daley & white
Parsons, Brinckerhoff, Quade & Douglas
Patel, Ms. Ruth
Paterson, Ms. Florence
Patnaude, Alfred
Patriot
Paul Revere Memorial Association
Payette Associates
Peabody and Arnold
Peirce, Mr. John W.
Peltier, Mr. Louis
Penn Central Transportation Co.
Pepper, Mr. Lewis
Perlend Environmental Technologies
Perry, Mr. Eric B.
Peter Elliot & Company
Peter Roudebush & Associates
Piacenzas, Ms. Norma
Piccione, Mr. Matt
Piers PAC
Pinches, Mr. Fred
Planning Office for Urban Affairs
Plumbers and Gasfitters Union Local No. 12, Boston
Pollard, Mr. Daniel
Porgione, Mr. Martin
Posen, Barry, R., Ph.D.
Poulos, George
Preble, Mr. George
Precast/Pre-Stressed Concrete Institute
Price, Mr. John
Price, Mr. William
Priest, Mr. Barry
Priest, Ms. Linda
Priestly, Ms. Jane
Prince, Mr. Keiko
Proctor, George
ProFac Cooperative Inc.
Pugliano, Mr. Emilie
Putnam Investor Services
Quincy School Commission Council
R.S.R. Realty Co., Inc.
Rackemann, Sawyer, Brewster
Raggio, Mr. Gabriel
Ramada Hotel
Rappaport & Raykov
Raytheon Company (Lexington)
Reader, Mr. David B.
Reason Foundation
Reisman, Jean
Relber, J.K.
Reliable Bus Lines, Inc.
Remax Collaborative
Riebels, Mr. Lance
Riley, Fran
Robert E. Hannigan Associates
Robert F. Walsh Associates
Robie Properties
Roofers and Waterproofers Union Local 33, Boston
Rose Associates

Rosenfeld, Michael
Rowan, Mr. Jim
Rowland, Ms. Marilyn
Ruggerio, Rosemarie
Russia Wharf Company
Sacred Heart Church
Salemme, Hugo
Salvucci, Mr. Ralph R.
Sanchez, Mr. Manuel
Sand, Mr. Michael
Sanford Ecological
SAR Engineering, Inc.
Sarno, Mr. Joseph
Sasaki Associates
Save the Harbor/Save the Bay
Sax and Company
Schiavone Construction Company
School of Civil Engineering, Georgia Tech.
Scialabba, Ms. Joyce
Scopa, Bobby
Scotch'n Sirloin, Ltd., Inc.
Sears Roebuck & Company
Sebouh Babrouti
Seifert, Mr. Erich Jan
Senate Transportation Committee
Seven Mile River Association
Shaeffer, K.H.
Shah Associates, P.C.
Shapiro, Mr. Eyal
Sheehan, Mr. Paul
Shen, Milsom & Wilke
Shen, Mr. Sam
Sierra Club
Silber, Mr. John
Skidmore, Owings, & Merrill
Slade Gorton & Company
Slep, Gary
Small, Mr. Fred
Smith, McNulty & Kearney
Smith, Mr.Hallam J.
Snow, Mr. Crocker
Snow, Mr. Roger L.
So, Mr. Simm
Social Policy Research Group
Society for the Preservation of New England Antiquities
Sokoloff, Mr. Martin
Solomon Parking
Sommer, Mark
South Boston Citizens Association
South Boston Community Development Corp.
South Boston Community Health Center
South Boston Information Center
South Boston Neighborhood House
South Boston Residents Group
South Boston Transportation Advisory Committee
South End Historical Society, Inc.
South End Transportation Committee
South Shore Chamber of Commerce
Spaulding & Slye
Spaulding Rehabilitation Hospital
Spaulding, Mr. Josiah A.
St. Cyr, Ms. Virginia
Stackpole, Mr. Richard
Standex International Corporation
Staropoli, Jean Denise
State Street Corporation
Stefano, Mr. Fred
Steffano, Mr. Joseph
Stella, Mr. John
Stone & Webster Engineering Corporation
Stone, Mr. Ken
Stop & Shop Companies, Inc.
Stouffer, Ms.Caroline
Straight, Ms. Susan
Stryker, Ms. Lois
Sullivan and Worcester
Sullivan Group
Sullivan Properties, Inc.
Sullivan, M.G.
Sullivan, Mr. D.F.
Sullivan, Mr. Jack
Summers, Mr. Paul
Susan Shell
Sverdrup Corporation
Sverdrup Parcel Corporation
Synergy Organization
Taft, Ms. Anna
TAMS
Tapscott, Mr. Jim
Tauro, Mr. Benny
Taylor, Mr. Michael
Tecce, Mr. Salvatore
Tech Environmental, Inc.
Teixeira, Ms. Maxine Tassinari
Testa, Mr. Gene
The Shea Oranization
The Stubblebine Co.
Thomas Planning Services
Thompson's Island Center
Thorne & Company
Tirella, Mr. Frank
Tirrell, Ms. Lillian
Tishman Construction Corporation
Tolman Manufacturing & Supply
Tomasc, Mr. John

Trammell Crow Company
Trust for Public Land
Trustees of the Reservation
TSJ Management
Tsongas, Mr. Paul
Tufts University
Tullock, Mr. Christopher
Turner Fisheries
Tuttle, Mr. William
Two 40 Southampton Street, Inc.
UHB Inc.
United Bus Owners of America
University of Lowell, Department of Work Env.
University of Massachusetts, Boston
University of Massachusetts, Economics Department
Urban Harbor Institute
Urban Image Corporation
Vander Waker, Mr. Peter
Vandursen Airport Services
Vanesse/Hangen
Venezia, Mr. Larry
Vetter, Mr. Henri
VFW-Order of the Sons of Italy
VHB
Vitale, Ms. Christine
Vogel, Mr. Raymond H., Jr.
Vollmer Associates
Wakefield Concrete
Wang Industrial Laboratories, Inc.
Wardell, Mr. Joseph
WCH Industries, Inc.
Wehran Engineering
Weil, Alan
Welch, Ms. Mary Ellen
Wentworth Institute of Technology
Weston & Simpson Eng.
Whiting, Ms. Carolyn R.
Whittier Place Condominium
Whorter, Ms. Jess
Widett, Slaber & Goldman, P.C.
Wilbur Smith Associates
Wilson, Mr. David Gordon
Winniger, Mr. Jim
Winter, Mr. Carl
Wong, Ms. Ann
World Trade Center
World Wide Package Association
Yugveson, Mr. Haftor
Yuhas, Mr. William
Zagaski, Mr. Chester
Zarrilli, Vincent F.
Zenwa Inc.
Zeytoonian, Mr. Ronald J.
Zuccaro, John and Grace
Zupkus, Mr. John

List Of Technical Reports

LIST OF TECHNICAL REPORTS

This List of Technical Reports is divided into 3 parts:

1. A list of documents which were used in support of the Artery/Tunnel Project, some of which are referenced in the text of the 1990 Final SEIR (indicated by an asterisk). The list is organized by subject area.

2. A list of general references which are not specific to the Artery/Tunnel Project.

3. An additional list of other reports, letters, technical memoranda, meeting reports, and studies which were developed by the Massachusetts Department of Public Works and its management consultant, which were used as background materials for project development and SEIS/R purposes.

TECHNICAL SUPPORT DOCUMENTS AND REPORTS

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"Operations and Maintenance Concept Report" - B/PB - April 1990.

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"Project Civil Design Criteria" - B/PB - September 1989.

"Projectwide Highway Architecture" - Concept Report - B/PB - April 1990.

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"Utilities Relocations, Congress - North" - Preliminary Design Report - B/PB - October 1990.

"Waterproofing Systems" - Concept Report - B/PB - July 1990.

Economic Characteristics

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Energy

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Historic Resources

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Materials Disposal

"Appendix 7 - Water Resources and Dredge Material Disposal" - Supplement to Draft EIS/R - Cortell Associates - June 1983.

"Approach To Sampling And Analysis For General Materials Characterization In Support of Excavate Disposition" - - Camp Dresser & McKee - September 18, 1990.

* "Aquatic Resources Functions and Values, Volume I: Roadway, Tunnel, and Bridge Alternatives Assessment" - Cortell Associates - May 1990.

* "Aquatic Resources Functions and Values, Volume II: Disposal Site Alternatives Assessment" - Cortell Associates - May 1990.

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"Geophysical Investigation Spectacle Island Area, Boston, Massachusetts" - Weston Geophysical Corp. - June 1988.

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* "PCB Removal Work Plan, South Boston Haul Road" - Final Report - Camp Dresser & McKee Inc. - November 1990.

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"Recycling and Beneficial Use of Excavated Materials" - Construction Planning Report - Revised - B/PB - December 1990.

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* "Results Of Upland Disposal Site Screening Study" - BSC Group - November 1990.

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"Slope Stability And Related Design And Construction Considerations" - Supporting Report for April 1989 Conceptual Design - Bechtel Geotechnical Services - April 1989.

* "Soil Characterization Report" - Cortell Associates - May 1989.

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"The Development of Spectacle Island Design Concept, Criteria and Guidelines" - Draft - Wallace, Floyd, Associates - Undated.

"Traffic Impact Analysis Of Upland Disposal Sites" - Draft - BSC Group - November 1990.

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Noise And Vibration

* "Noise And Vibration Abatement" - Draft Concept Report - B/PB - October 1990.

"Technical Support Document for Traffic Noise Analyses" - B/PB - November 1990.

Summary of Construction Activity

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"Evaluation of Soil Transportation Schemes" - B/PB - March 1988.

"Geotechnical Instrumentation" - B/PB - April 1990

"Groundwater and Construction Drainage" - B/PB - December 1990

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"Rodent Control at the Central Artery North Area - Boston, Massachusetts - A Review and Summary of the Control Program, April-September 1989" - B/PB - December 1989.

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Traffic/Transportation

* "A Procedure for Evaluating Safety Effectiveness of Freeway System Alternatives -- The Central Artery Accident Model" - Jack E. Leisch Associates for B/PB - April 1987.

"Central Artery Parking" - Study Report Draft - B/PB and Cambridge Systematics, Inc. - December 1990.

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Water Quality

"Distribution of Polluted Materials in Massachusetts Bay" - New England Aquarium - December 30, 1976.

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Wetlands and Waterways

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Other

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ADDITIONAL LIST OF REPORTS, LETTERS, MEMORANDA, AND STUDIES PREPARED FOR THE CENTRAL ARTERY/TUNNEL PROJECT

Central Artery (I-93/Tunnel (I-90) Project I-93 Alignment Comparison Report Volume I.

Central Artery (I-93/Tunnel (I-90) Project I-93 Alignment Comparison Report Volume II.

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Central Artery (I-93/Tunnel (I-90) Project Comparative Evaluation of Logan International Airport Interchange Concepts.

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Letter of August 15, 1989, from D. Marshall to WVT responding to the July 18th letter above.

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Memo of VA to RWB of 6-8-90, "MBTA Meeting of 06/06/90 East Boston, D007A, 1995."

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Memorandum to C. Hebb, "Central Artery Value Engineering (V.E.) Study." Results = 1.2, .08 Alternate Ramps.

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Letter from DWM to WVT of January 23, 1990, regarding South Boston Ramp Street Extension Bridge Type Study Report.

Letter from DWM to WVT of March 2, 1990, regarding South Boston Haul Road additional drainage changes.

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Letter from DWM to WVT of September 7, 1990 regarding responses to FHWA comments of August 9, 1990 on IPCS and O&M Concept Reports.

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Letter from DWM to WVT of September 10, 1990, regarding South Boston 100% Preliminary Engineering documents for D004A Package.

Letter from DWM to WVT of November 6, 1990, regarding alternative configuration for D024A.

Letter from DWM to WVT of May 25, 1990, regarding South Boston D004A Preliminary Engineering documents.

Letter from Anthony J. Fusco, FHWA Division Administrator, to WVT, November 13, 1990, regarding South Boston 100-scale design resubmission.

Letter from WVT to DWM of April 17, 1990, regarding Draft Structural Type Study Report -- Tunnel & Boat Sections, South Boston D004A.

Letter from WVT to DWM of July 10, 1990, regarding South Boston D004A Preliminary Engineering architectural review.

Letter from WVT to DWM of September 24, 1990, regarding South Boston Haul Road changes to ROW plans.

Interoffice Correspondence from WVT to M. Mirsky of July 12, 1989, regarding relocation of Track 61.

Letter from M. Mirsky to WVT of June 30, 1989, regarding relocation of Track 61.

Letter from DWM to WVT of August 16, 1989, regarding study of new access to Cabot Yard from W. Fourth St.

Letter from DWM to WVT of September 26, 1989, regarding South Boston realignment of Viaduct St.

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Letter from WVT to DWM of September 15, 1989, regarding design of Vent Bldg. #5.

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Letter from WVT to DWM of December 18, 1989, regarding design of boat sections using tie-down anchors.

Letter from WVT to Edwin P. Holahan of March 12, 1990, regarding HOV plan - final Concept Report.

Letter from WVT to DWM of September 28, 1990, regarding Cut & Cover Tunnel Ventilation System Concept Report.

Letter from WVT to Anthony J. Fusco, FHWA Division Administrator, August 22, 1990, regarding D004A Scoping Package comments.

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Letter from DWM to WVT of October 15, 1990, regarding South Boston alternate locations for West Service Road.

Letter from DWM to WVT of May 25, 1990, regarding South Boston alignment modifications/construction staging plans.

Letter from DWM to WVT of June 29, 1990, regarding 100-scale submittal for South Boston Proposed Action Alignment.

Letter from WVT to James A. Walsh, FHWA Division Administrator, June 15, 1989, regarding South Boston Proposed Action Alignment - BMIP.

Letter from WVT to DWM of October 24, 1989, regarding realignment of Viaduct St.

Letter from DWM to WVT of January 16, 1990, regarding South Boston Type Study Report for Tunnels/Boat Sections.

Letter from WVT to DWM of January 3, 1989, regarding South Boston Vent Bldg. #5 siting.

Letter from DWM to WVT of December 5, 1989, regarding submittal of Draft Concept Report for D024A.

Letter from Edwin P. Holahan, FHWA Acting Division Director, to WVT, February 14, 1990, regarding South Boston 100-scale design resubmission of October 5, 1989.

Letter from WVT to DWM of January 17, 1990, regarding South Boston Revised Proposed Action.

Letter from DWM to WVT of December 29, 1989, regarding FHWA & MDPW comments for South Boston Revised Proposed Action.

Letter from Anthony J. Fusco to WVT of September 7, 1990, regarding Scope Resolution/Authorization.

Letter from WVT to James A. Walsh, FHWA Division Administrator, October 5, 1989, regarding South Boston Proposed Action 100-scale submission.

Letter from M. Mirsky to WVT of November 16, 1988, responding to November 1, 1988 letter from WVT regarding South Boston alignment revisions.

Interoffice Correspondence from WVT to M. Mirsky of November 22, 1988, responding to November 16th letter above.

Minutes of MDPW review meeting of April 13, 1989.

Letter from David W. Davis, MPA Executive Director, to WVT, June 7, 1989, regarding review of Proposed Action Plan, South & East Boston.

Letter from David W. Davis, MPA Executive Director, to WVT, June 7, 1989 regarding review of Supportive Engineering Report.

Responses to comments raised at FHWA meeting on April 20, 1989.

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Letter from James A. Walsh, FHWA Division Administrator, to WVT, April 26, 1989, regarding review of HOV System Operation Report.

Letter from WVT to M. Mirsky of July 18, 1989, regarding South Boston Proposed Action, MDPW & FHWA review comments.

Letter from WVT to M. Mirsky of November 1, 1988, regarding South Boston alignment.

Letter from James A. Walsh, FHWA Division Administrator, to WVT, July 21, 1989, regarding South Boston 100-scale design submission.

Letter from WVT to M. Mirsky of January 21, 1988, regarding open vs. closed studies.

Letter from WVT to M. Mirsky of April 19, 1988, regarding revised working alignment for CA/THT Project.

Letter from WVT to M. Mirsky of January 17, 1988, regarding review of Viaduct St. realignment.

Letter from WVT to M. Mirsky of February 27, 1989, regarding January 31, 1989 FHWA review meetings.

Letter from WVT to M. Mirsky of April 25, 1989, regarding Report on Use of Tie-Down Anchors.

Letter from WVT to M. Mirsky of April 26, 1989, regarding Seismic Exposure Evaluation Concept Report.

Letter from WVT to M. Mirsky of May 1, 1989, regarding South Boston Cut & Cover Tunnel vs. Open Boat Section Comparative Study.

Letter from WVT to M. Mirsky of May 2, 1989, regarding Tunnel Finishes Concept Report.

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Central Artery (I-93)/Tunnel (I-90) Project - I-93 Alignment Comparison Report, Volume I.

I-93 Central Artery North of Causeway Street CANA Interface Area Bridge Type Study for Ramps C-T, T-C, T-S, S-T.

I-93 Central Artery Area North of Causeway Street CANA Interface Area Area Bridge Type Study for Ramps C-T, T-C, T-S, S-T, & S-CS, February, 1990 (Draft).

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I-93/Central Artery Causeway Street to North Area Limit, Leverett Circle Connection/ Interchange Selection Report, September 1989.

Preliminary Design Report, Central Artery North Area Interface, June 1989.

I-93 Central Artery Causeway Street to North Area Limit, Response to Proposed Action 100-Scale Comments, April 1990.

D015A/D0112A Structural Type Study, June 1990.

D011A Structural Type Study, September 1990.

D012B Structural Type Study, August 1990.

Preliminary Design Report (Draft) D015A, December 1990.

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Concept Report of Charles River Bridges, November 25, 1987 (Draft).

Dewey Square Tunnel Report (Alignment Alternative - Kneeland Street to State Street), October 15, 1987 (Draft).

MBTA South Station Transportation Center I-93 Northbound Atlantic Avenue Alignment Impact Analysis, June 22, 1989.

I-93 Alignment Comparison Report; Vol. I I-93 Northbound from West Fourth Street to High Street; Fort Point Channel Alignment vs. Dorchester Ave. Alignment vs. Atlantic Ave. Alignment, April 1989.

I-93 Northbound from Congress Street to North Street Working Alternative II Alignment vs. Stack Alignment vs. SEIS/R Proposed Action Alignment, October 1989.

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Evaluation of Leverett Circle Connection Alternatives, May 11, 1987.

I-93/Central Artery Causeway Street to North Area Limit (Proposed Action).

D013A Bridge Type Study.

D019A Bridge Type Study.

D019B Bridge Type Study.

D019B Charles River Bridge Type Study.

D009A Bridge Type Study for South Bay Interchange Area.

D009C Bridge Type Study for South Bay Interchange Area.

D012A Bridge Type Study for South Bay Interchange Area.

Fire Sprinkler Study.

Notes of March 21, 1990 Meeting between MDPW, B/PB and FHWA requesting further development of MTC alignment.

Letter of April 16, 1990 from D. Marshall to WVT, as addendum to March 15 letter as requested in March 21 meeting.

Letter of March 21, 1989 from WVT to D. Marshall on Bird Island Flats Tunnel; request for design exception; shoulder.

Letter of April 23, 1990 from D. Marshall to WVT, responding to March 21 letter above.

FHWA Letter of February 7, 1990 from E.P. Holohan to WVT, reviewing 100-scale design resubmission.

Letter of May 15, 1990 from D. Marshall to WVT, responding to 15 comments mentioned in above February 7 letter.

FHWA Letter of April 19, 1990 from A.J. Fusco to WVT, comments on the Facility, Operation and Financial Impacts on Logan Airport Report.

Letter of April 30, 1990 from WVT to D. Marshall, requesting a response to comments in above April 19 letter.

Letter of June 8, 1990 from D. Marshall to WVT, responding to April 19 and April 30 letters.

FHWA Letter of November 6, 1990 from A.J. Fusco to WVT, discussing the remaining outstanding issues.

Notes of Meetings of FHWA, MDPW and B/PB Representatives as follows:

April 19 & 20, 1990, Subject: Review of East Boston Proposed Action 100-Scale Submittals of 2-17-89.

June 27, 1989, Subject: Review of Alternative Alignment Studies for Bird Island Flats and Braiding Studies for Route 1A.

August 22, 1989, Subject: Review of August 15 Submittal of B/PB to MDPW for East Boston.

November 15, 1989, Subject: Review of East Boston Revised Proposed Action.

July 25, 1990, Subject: Review of East Boston Revised Proposed Action.

December 5, 1989, Subject: Review of Modifications to East Boston I-90 Logan Airport Interchange (April 1990).

FHWA Letter of June 8, 1989 from J.A. Walsh to WVT, comments on proposed action alignment.

MDPW letter of July 18, 1989 from WVT to M. Mirsky, identifying 8 outstanding design issues.

Letter of August 15, 1989 from D. Marshall to WVT, responding to above letter.

Letter of January 5, 1990, from WVT to D. Marshall, requesting evaluation of 4 alternatives for alignment of Bird Island Flats.

Letter of February 6, 1990 from D. Marshall to WVT, responding to January 5 letter above.

Letter of March 15, 1990 from D. Marshall to WVT, providing more information on MTC alignment to complete January 5 response letter above.

Comparative Evaluation of Logan International Airport Interchange Concepts - Revision 1 - June 1987.

Comparative Evaluation of Logan International Airport Interchange Concepts - Revision 2 - August 1987.

East Boston - Bird Island Flats cut & Cover Tunnel vs. Open Boat Section - Comparative Study - April 1988 (Requested in Letter of January 21, 1988 from WVT to M. Mirsky).

East Boston - Vent Building Location Study - January 1989.

East Boston - Cut & Cover Tunnel vs. Open Boat Section - Comparative Study - Addendum No. 1 - Revision 1 - March 1989.

East Boston - Cut & Cover Tunnel vs. Open Boat Roadway - Comparative Study - Facility, Operational & Financial Impacts on Logan International Airport - September 1989 (Supplement to above report -- both reports requested in letter of June 22, 1989 from WVT to M. Mirsky and transmitted by letter of September 19, 1989 from D. Marshall to WVT).